PROFESSIONAL PAPERS OF THE ENGINEER DEPARTMENT, U. S. ARMY.

No. 18.

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# REPORT

OF THE

# GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL

MADE

BY ORDER OF THE SECRETARY OF WAR ACCORDING TO ACTS OF CONGRESS OF MARCH 2, 1867, AND MARCH 3, 1869,

UNDER THE DIRECTION OF

BRIG. AND BVT. MAJOR GENERAL A. A HUMPHREYS,

CHIEF OF ENGINEERS,

BY

CLARENCE KING,

U. S. GEOLOGIST.

VOLUME V.

QK193
.W3
1871
C.2

UNITED STATES GEOLOGICAL EXPOLRATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

# BOTANY.

BY

SERENO WATSON,

AIDED BY

PROF. DANIEL C. EATON, AND OTHERS.

SUBMITTED TO THE CHIEF OF ENGINEERS AND PUBLISHED BY ORDER OF THE SECRETARY OF WAR
UNDER AUTHORITY OF CONGRESS.

ILLUSTRATED BY A MAP AND FORTY PLATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1871.

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# TABLE OF CONTENTS.


| | Page. |
|---|---|
| INTRODUCTORY LETTER | ix |
| GENERAL REPORT | xiii |
| GEOGRAPHICAL NOTES | xiii |
| METEOROLOGICAL NOTES | xvii |
| GENERAL CHARACTERISTICS OF THE VEGETATION | xxii |
| VALLEY FLORA | xxix |
| MOUNTAIN FLORA OF THE BASIN | xxxiv |
| FLORA OF THE WAHSATCH AND UINTAS AND OF THE WASHOE MOUNTAINS | xxxvii |
| SOUTHERN FLORA OF NEVADA AND UTAH | xl |
| INTRODUCED PLANTS | xli |
| RÉSUMÉ OF DISTRIBUTION AND RANGE | xli |
| CRYPTOGAMIC FLORA | xlvii |
| AGRICULTURAL RESOURCES | xlviii |
| CONCLUSION | lii |
| CATALOGUE OF THE KNOWN PLANTS OF NEVADA AND UTAH WITH DESCRIPTIONS OF SUCH GENERA AND SPECIES AS DO NOT OCCUR EAST OF THE MISSISSIPPI | 1 |
| ADDITIONS TO THE CATALOGUE | 416, 496 |
| APPENDIX—SYNOPSES OF GENERA | 427 |
| INDEX TO CATALOGUE AND APPENDIX | 499 |

# LIST OF PLATES.

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The Plates illustrating the present volume, as well as the accompanying Map, were engraved and printed by JULIUS BIEN, of New York. The original drawings were executed by Mr. J. H. EMERTON, of Salem, Mass.


Map of the Northern portions of Nevada and Utah............facing page 1

PLATE I. RANUNCULUS ANDERSONII and Var. TENELLUS..do.... 7

II. ARABIS LONGIROSTRIS............do.... 17

III. CAULANTHUS HASTATUS............do.... 28

IV. LEPIDIUM DICTYOTUM, L. FREMONTII and L. NANUM............do.... 30

V. CLEOME SPARSIFOLIA............do.... 32

VI. STELLARIA KINGII, CLAYTONIA UMBELLATA and CALYPTRIDIUM ROSEUM............do.... 44

VII. LUPINUS BREVICAULIS and L. UNCIALIS........do.... 54

VIII. TRIFOLIUM GYMNOCARPON and T. ANDINUM....do.... 62

IX. DALEA POLYDENIA............do.... 64

X. DALEA KINGII and ASTRAGALUS CALYCOSUS....do.... 66

XI. ASTRAGALUS ATRATUS............do.... 69

XII. ASTRAGALUS PTEROCARPUS and A. SIMPLICIFOLIUS............do.... 71

XIII. ASTRAGALUS JEJUNUS and A. TEGETARIUS.....do.... 76

XIV. ŒNOTHERA PTEROSPERMA, OROGENIA LINEARIFOLIA and GALIUM BIFOLIUM............do.... 120

XV. BRICKELLIA LINIFOLIA and B. OBLONGIFOLIA, Var. ABBREVIATA............do.... 137

XVI. ASTER KINGII and A. PULCHELLUS............do.... 142

XVII. TOWNSENDIA SCAPIGERA and ERIGERON STENOPHYLLUM............do.... 152

XVIII. CHÆNACTIS MACRANTHA and BURRIELIA NIVEA..do.... 174

XIX. TANACETEM DIVERSIFOLIUM, T. CANUM and ARTEMISIA SPINESCENS............do.... 180

PLATE XX. STEPHANOMERIA MYRIOCLADA, S. PANICULATA, S. EXIGUA, S. PENTACHÆTA and GLYPTOPLEURA MARGINATA.................... facing page 198
XXI. ANTIRRHINUM KINGII and A. VAGANS..........do.... 216
XXII. SYNTHYRIS PINNATIFIDA and CORDYLANTHUS KINGII ........................................do.... 227
XXIII. MERTENSIA BREVISTYLA, ERITRICHIUM KINGII, E. GLOMERATUM and Var., ECHINOSPERMUM REDOWSKII and Var., and E. PATULUM......do.... 246
XXIV. TRICARDIA WATSONI..............................do.... 258
XXV. COLLOMIA LEPTALEA, GILIA BIGELOVII and G. NUTTALLII.................................do.... 263
XXVI. GILIA WATSONI, G. LEPTOMERIA, and G. CAMPANULATA ......................................do.... 271
XXVII. NICOTIANA ATTENUATA and N. BIGELOVII......do.... 276
XXVIII. ORYCTES NEVADENSIS and ASCLEPIAS CRYPTOCERAS.......................................do.... 275
XXIX. ERYTHRÆA NUTTALLII..........................do.... 277
XXX. HESPEROCHIRON CALIFORNICUS ................do.... 281
XXXI. ABRONIA TURBINATA and A. UMBELLATA........do.... 285
XXXII. HERMIDIUM ALIPES..............................do.... 286
XXXIII. ERIOGONUM NUTANS and OXYTHECA WATSONI...do.... 307
XXXIV. OXYTHECA PERFOLIATA and CHORIZANTHE WATSONI.......................................do.... 312
XXXV. BETULA OCCIDENTALIS ..........................do.... 323
XXXVI. LEUCOCRINUM MONTANUM, ALLIUM ANCEPS, A. FALCIFOLIUM and A. UNIFOLIUM..............do.... 349
XXXVII. ALLIUM BISCEPTRUM, A. SERRATUM, A. ACUMINATUM, A. SANBORNI, A. ATTENUIFOLIUM, and A. PALMERI..................................do.... 351
XXXVIII. ALLIUM NEVADENSE, A. ATRORUBENS, A. TRIBRACTEATUM, A. BIGELOVII and SCAPOSUM....do.... 352
XXXIX. EPHEDRA ANTISYPHILITICA......................do.... 330
XL. EREMOCHLOE KINGII, E. BIGELOVII and PELLÆA BREWERI...................................do.... 396

OFFICE OF THE U. S. GEOLOGICAL EXPLORATION
OF THE FORTIETH PARALLEL.
*New Haven, August,* 1871.

GENERAL: Herewith I have the honor to transmit Volume V of the Geological Exploration of the 40th Parallel. It is a report on the Botany of the region embraced within my lines of study, and has been made in obedience to your instructions of March 22, 1867.

The field investigations, as well as analytical and literary labor, have been performed by Mr. SERENO WATSON. Very generous herbarium facilities were placed at his disposal by Professor DANIEL C. EATON of Yale College, who also contributes a valuable paper to the volume.

Very respectfully, your obedient servant,

CLARENCE KING,
*Geologist in charge.*

Brigadier General A. A. HUMPHREYS,
*Chief of Engineers, U. S. Army,*
*Washington, D. C.*

# GENERAL REPORT.

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GEOGRAPHICAL NOTES. The territory within which botanical collections have been made in connection with the United States Geological Survey of the 40th Parallel lies wholly within the limits of Northern Nevada and Utah. It forms a narrow tract at no point exceeding seventy miles in width, between the meridians of 111° and 120°, and extending from the parallel of 39° at the southwestern limit to that of 42° at the northeastern. This region constitutes the northern portion of what was at first designated as the "Great Basin," the high plateau, without outlet for its waters, separated on the north by low divides from the valley of the Snake River and continuing southward until it merges into the desert of the Lower Colorado. Geologically considered, however, as well as botanically, the term is now properly made to include the whole similar arid stretch of country northward to the plains of the Columbia in latitude 48°.

The lofty and unbroken range of the Sierras bounds this section of the Basin on the one side by its steep eastern slope, entering Nevada at only a single point, where it throws over the border a high flanking spur, the Washoe Mountains. On the opposite side lies the broad and nearly equally elevated system of the Wahsatch, broken through by the Bear, Weber, and Provo Rivers, which head among the peaks of the adjoining Uintahs. The intervening space, 450 miles broad in latitude 42°, but narrowed by the convergence of the opposing mountains to about 200 miles in latitude 37°, is for the most part occupied by numerous short and somewhat isolated minor ranges, having a general north and south trend, and at average distances of about twenty miles. The bases of these ranges are usually very narrow, even in the most elevated rarely exceeding eight or ten miles in breadth, the slopes abrupt and the lines of foothills contracted, the mesas grading at a low and uniform angle into the broad uninterrupted valleys. Over the larger portion of the territory, and especially in Nevada, the combined areas of the valleys and the area occupied by the mountains and accompanying foothills are very nearly equal.

The main depressions within this region are two, one at the base of the Sierras at a level of about 3,850 feet above the sea, into which flows all of drainage there is from the whole northern half of Nevada and from the eastern slope of the Sierras, the other the "Great Salt Lake Basin," at an altitude 400 feet greater, close upon the base of the Wahsatch and receiving the waters from that range above latitude 40° and from the northeastern portion of the Uintas. Into the first flow the Truckee, Carson, Quinn's, and Humboldt Rivers. The Truckee is a clear cold stream, which issues from Lake Tahoe in the Sierras and after a rapid descent breaks through the Virginia Mountains and turning north soon empties into Pyramid and Winnemucca Lakes. These are much the deepest of all the lakes of the Basin, being hemmed in by mountains, and are moderately saline. The Carson River also rises in the Sierras, farther to the south, but after leaving the base of the mountains is a less rapid stream and gradually becomes somewhat alkaline. Inclining more to the eastward it forms a small shallow lake on the border of Carson Desert, and thence issues in a number of devious channels, and is finally spent in an extensive "sink" or alkaline mud plain of some twenty or thirty miles in diameter. Of a like character are the "Mud Lakes," lying north of Pyramid Lake and fed by Quinn's River, which has its source in southeastern Oregon. Beyond the limits of the survey to the south are Walker's and some other smaller lakes, supplied by streams from the Sierras, but all strongly saline.

From this western depression the general level of the country rises gradually eastward very nearly to the border of Nevada, where the valleys have an altitude of about 6,000 feet. Here in the northeastern part of the State the Humboldt River takes its rise, by far the most important river of the basin, not only as the longest but as opening a passage for 300 miles to the Central Pacific Railroad through the mountain ranges that would otherwise have proved a serious obstruction. It is nowhere a large stream, receives very few affluents, and in some parts of its course is very tortuous. It at length spreads out into Humboldt Lake, shallow and sub-alkaline, and from this the little remaining surplus water finds its way in a manner similar to the Carson River into the same sink.

The descent of 2,000 feet from Eastern Nevada into the Great Salt Lake Basin is almost immediate, nearly the whole northwestern portion of Utah being an alkaline desert, broken by fewer mountain or hill ranges and

but little above the level of the lake. The lake itself is for the most part very shallow, in no place over fifty feet in depth, the waters a concentrated solution of salt. As with all these sheets of water the shore-line and consequent area vary greatly in different years.

The intermediate ranges of the Basin are very similar to each other in character. They vary in altitude from one to six thousand feet above the valleys, culminating in occasional peaks scarcely ever so rugged that they cannot be ascended from some direction upon mules. They are cut up by numerous ravines or "cañons," which are narrow, very rarely with an acre of intervale or surface approaching to a level, the sides sometimes rocky or precipitous, more frequently sloping to the summits of the lateral ridges. In geological structure these ranges are more or less complicated, showing rocks of all ages from the azoic to the glacial period, here metamorphic rocks, quartzites, slate, and limestones, there an outburst of granite or syenite, volcanic rocks of often the most diverse and picturesque colors, or broad table-lands of lava overflow. The erosion and decomposition of these various rocks have filled the valleys to a monotonous level with a detritus of gravel, sand, or silt, and given to them that accumulation of alkaline salts which is so marked a peculiarity of the country.

With few exceptions also these mountains are for most of the year wholly destitute of water, with but small rivulets in the principal cañons, frequently with only scanty springs here and there at their bases, irrigating a few square yards of ground. Even where the mountain supply is sufficient to send a stream into the valleys it is usually either soon entirely evaporated, sinks into the porous soil, or becomes demoralized with alkali and is "lost" in the mud of the plain. The lowest portion of nearly every valley is occupied by some extent of alkali flat, where in the winter season the water collects and the softened clay-like mud is bottomless and impassable. As the moisture evaporates under the heat of coming summer the level naked surface becomes hard and pavement-like, or covered with a snowy incrustation or deposit of salt or carbonates. The springs and wells even are often more or less saline, and thermal springs are not rare.

The chief exceptional ranges in northern Nevada, which from their greater altitude receive heavier snowfalls in winter, retained through the year in greater or less quantity in the more sheltered depressions of the higher peaks, and which in summer are subject to more abundant rains, are the

West Humboldt Mountains, 100 miles east of the California state-line, the East Humboldt Mountains, 75 miles from the Utah line, and the Toyabes, nearly intermediate between the two. Star Peak is the highest point of the first range, with an altitude of nearly 10,000 feet, but with little deposit of snow and the vegetation of the summit scarcely subalpine. Several constant streams here flow from the principal eastern cañons and reach the middle of the valley, where they supply irrigation for as many small ranches. The Toyabe range, especially in its southern portion, is higher, several of its peaks having an altitude of from 10,000 to 12,000 feet, with more snow and fuller streams. The waters of the eastern slope are spent in Smoky Valley. On the western side lies Reese River, flowing northward toward the Humboldt of which it is a reputed tributary. In the upper portion of its course of 150 miles it is reënforced to some extent by the drainage of the Shoshone Mountains, a rather high range west of the Toyabes, but as it nears Humboldt Valley it diverges into side-channels and seldom has volume sufficient to reach the main river itself.

The East Humboldt Mountains are by far the most stern and alpine of all these ranges, the main peaks between 11,000 and 12,000 feet in height, precipitous and ragged, the deeper cañons evidently scooped out by glaciers, gemmed with snow-fed lakes beneath the peaks and carrying full streams into the valleys. The southern portion, however, below Frémont's Pass, is less rugged and of different geological structure, mainly of nearly horizontal strata of limestone. The cañons here, often mere gorges with close precipitous walls, are perfectly dry on the eastern slope, the melting snows sinking almost immediately, but reappearing at the base in bold ice-cold springs. The water from these springs and streams unites to form Ruby and Franklin Lakes, bodies of nearly fresh water, very shallow and largely occupied by a dense growth of "Tule," (*Scirpus validus.*) As usual in these ranges the western slope is much the more gentle, with a broader line of foothills. The streams upon this side form the South Fork of the Humboldt. The "Clover Mountains" of the Catalogue form the northern extremity of this range, isolated by a depression known as Secret Valley, but of equal height and similar character.

Such is a general description of the country as far east as the foot of the Wahsatch in Utah. These mountains, upon a broad base of nearly fifty miles in width, and with an irregular crest-line 10–12,000 feet high, have a system of long deep well-watered cañons, often exceedingly rocky and some-

times cleft like a gateway to the valley level, with perpendicular mountain walls on each side, but usually opening out at some part of their course into meadow-like basins or "parks." The prevalent western winds deposit their moisture, which they have gathered in the traverse of the Basin, in abundant snows in winter and at other seasons in frequent and occasionally heavy rains. The upper cañons and mountain slopes are to some extent timbered, much more generally so than in any of the ranges westward, and the naked peaks above have a truly alpine vegetation. The Uintas, which connect immediately with the Wahsatch and extend eastward on the line of the 41st parallel for a distance of 150 miles to Green River, where they meet the outspurs of the Rocky Mountains of Colorado, have more of the character of those mountains, with broad open cañons and extended lines of foothills, the peaks overtopping those of the Wahsatch, glacier-scored and polished at the northern base, but the declivity upon the opposite side stretching southward beyond the limits of vision in a high plateau broken only by the deeply-worn channels of numerous rapid streams, tributaries of the Uinta and Green Rivers.

METEOROLOGICAL NOTES. The climate of the Basin in this latitude may be said in general to be characterized by a very dry atmosphere and consequent small amount of rain and snow, especially in the valleys, and by a cold winter and correspondingly hot summer, the greatest extremes of each kind occurring at the lower altitudes of the western depression. The data, however, for definite general statements are scanty. No measurement of the rainfall at any point in the Great Basin has been reported. It varies greatly with the altitude and is probably considerably more upon the eastern slope of the mountains than upon the western. Though any statement of the average annual amount must be largely conjectural, yet it may be roughly estimated at eighteen inches, of which one-half may be considered as falling between the months of April and November inclusive. In the warmer months the rains are always limited and of short duration, centering about the mountain peaks and occasionally very severe. Dews and frosts are almost wholly unknown.

Field-notes taken in Western Nevada in 1867 show that from the last week in July to August 31st only ten days were nearly cloudless, while on thirteen days there was rain, though in most cases only in sprinkles or light showers at the place of observation. In September, ten days again were wholly without clouds though exceedingly hazy, as was also the case in August,

and on five days there was rain. On the 16th, snow fell on Star Peak. In October, twelve days are recorded as clear and no rain fell on the remainder. In November, six days only were clear and on five days rain, with snow upon the mountains on the 6th, and the unusual occurrence of frost on the 23d and 25th in the lower Humboldt Valley, though since early in October the minimum of the thermometer had often been below the freezing point. December was much more generally cloudy and with several heavy storms, a rain on the 8th continuing all day. On the 17th, a foot or more of snow fell, which drove the party in from the field, followed on the 23d by a very severe rainstorm that was repeated on the 30th and 31st.

The winter of 1867–8 was spent at Carson City, at the base of the Sierras, in about latitude 39°10′ and at an elevation of 4,700 feet. Here a snow fell early in January to the depth of about a foot, which remained until March, reënforced by occasional very light snows, the outskirts of severer storms in the mountains above. Though more or less cloudy through March very little rain fell until the 1st of April, and warm spring-like weather began two weeks later. Flowers appeared at once and vegetation advanced rapidly, so that on the 8th of May the party again took the field, depending upon grass for the support of the animals. For six weeks later the weather was unsettled with occasional light snows and showers, two or three times continuing nearly all day. The last slight snowfall was on the 24th of June, and summer immediately followed.

In the three months from July to September, 1868, which were spent principally in the vicinity of the East Humboldt Mountains, there were eleven days in July and five days in early August upon which rain fell, mostly in severe thunder storms originating upon the peaks and passing eastward over the valleys. From that time until the 10th of October there was but a single light shower.

The only basis upon which the mean annual temperature of this region can at present be calculated is found in the unpublished observations made at the several military posts, under the direction of the Medical Department of the United States Army. These records for the years 1867 and 1868 made at Camp Douglas near Salt Lake City, at an altitude of about 4,500 feet, show a mean temperature for the months of August, July, September, and June, (arranging the months in the order of their temperatures,) of 70.8° F.; for October, May, April, and November, of 51.0°; for December

March, February, and January, of 32.8°; giving a mean annual rate of 51.5°. The monthly means range from 28.6° in January to 76.2° in August. At the more elevated stations in Northern Nevada, (Fort Ruby, Camp Halleck, Camp Scott, Camp McDermit, and Camp McGarry,) the corresponding averages appear very nearly four degrees lower, October only having a difference of twice that amount and ranking after the month of May instead of before it. On the other hand the temperature at Fort Churchill on the Carson River in Western Nevada, at an altitude of 4,284 feet, from March to September ranged from two to four degrees higher than at Camp Douglas, though from October to December nearly as much lower.

During the winter of 1867–'68 at Carson City, the month of December, as stated, was mild, with an average daily maximum of not less than 50° and a mean minimum of about 20°. January, on the other hand, was remarkably cold, with a mean maximum of about 26° and a corresponding minimum of 10°, the observed extremes of temperature being 35.5° and —10.0°. This cold term continued through February, the mean daily maximum of that month being about 35° and the minimum below 10°, and for the first half of the month 6°, the extreme maximum observed being 50.5° and the extreme minimum —16.0°. It is very notable that in Virginia City on the eastern slope of Mount Davidson, twelve miles distant and at an elevation nearly 1,500 feet greater, the temperature was uniformly and considerably higher.

The thermometrical observations taken in the field in 1867 and 1868 were not sufficiently continuous at any one station or altitude to authorize any very positive general deductions. The following series of readings, or when possible means of readings, will fairly illustrate, however, in some degree the daily range of temperature, the usually great dryness of the air as shown by the differences of the dry and wet bulb thermometers, the heat of the direct sun's rays as shown by the black bulb thermometer, and the amount of night radiation as shown by the minimum thermometer, while some other matters are noted as of interest in this connection. The first table is confined mainly to the low valleys of Western Nevada, the second to the higher valleys of Eastern Nevada, and the third to the mountain summits. It should be stated that the wet bulb was always fully exposed to whatever wind was blowing, as thus securing reliable indications of the actual evaporating power of the air under existing conditions.

1. *Thermometrical observations at stations in the valleys of Western Nevada.*

| Station. | Altitude. | Date. | Hour. | Dry bulb. | Wet bulb. | Difference. | Black bulb. | Notes. |
|---|---|---|---|---|---|---|---|---|
| | | | | °F. | °F. | °F. | °F. | |
| Truckee Desert....... | 3974 | July 29 | 9.00 a. m. | 84.0 | 56.0 | 28.0 | 139.0 | At 10.15, BB. Ther. 142.5° and temp. of light-colored sand, 130°. Max. 105.6°. |
| | 4258 | 29 | 12.15 p. m. | 94.0 | 58.3 | 35.7 | | |
| | | 30 | 5.00 a. m. | 69.0 | 51.0 | 18.0 | | Cloudy. Min., 61.6°. Temp. of sand, 69°. |
| Carson Desert........ | 4267 | 31 | 8.20 a. m. | 73.5 | 64.3 | 9.2 | | Thunder-storm last evening and cloudy at night. |
| | | | 12.00 m. | 85.0 | 65.2 | 19.8 | | |
| | | | 7.00 p. m. | 83.0 | 62.0 | 21.0 | | |
| | | Aug. 1 | 5.00 a. m. | 65.0 | 58.8 | 6.2 | | |
| Hill... | 4824 | .......... | 3.15 p. m. | 98.0 | 62.0 | 36.0 | | |
| | 4137 | .......... | 8.00 p. m. | 85.0 | 60.2 | 24.8 | | |
| | 4036 | 3 | 5.00 a. m. | 66.4 | 57.3 | 9.1 | | Minimum, 66°. |
| | 4107 | .......... | 10.30 a. m. | 94.0 | 66.3 | 27.7 | 160.0 | Temp. of Carson River, 75.5°. |
| Hill... | 4596 | .......... | 2.00 p. m. | 93.0 | 62.0 | 31.0 | | Rain at 12.30. Temp. of rain 70.5°. |
| | 4036 | 4 | 6.00 a. m. | 67.5 | 60.4 | 7.1 | | Min., 51°. Max., 99.6°. |
| | | | 1.00 p. m. | 99.0 | 65.0 | 34.0 | 177.6 | Temp. of soil, (gray clay,) 128°. |
| Soda Lake. | 3906 | 5 | 7.15 a. m. | 74.5 | 60.0 | 14.5 | 125.5 | Minimum, 61°. |
| | 4121 | .......... | 2.00 p. m. | 99.4 | 62.2 | 37.2 | 162.0 | Temp. of volcanic sand, 152°. |
| Humboldt Desert..... | 3893 | 6 | 5.00 a. m. | 65.7 | 51.0 | 14.7 | | |
| | | | 2.00 p. m. | 96.5 | 63.5 | 33.0 | 165.5 | Temp. of clay soil, 132°. Max., 100.8°. Temp. of Humboldt River at 7 p. m., 74°. |
| Truckee Valley....... | 3995 | Aug. 13 to 21. | 6.00 a. m. | 47.5 | 45.9 | 1.6 | | Mean readings for six days. A week of very uniform weather, with no showers, few clouds, and light winds. Mean Min., 40.9°. Mean Max., 93.0° +. Max. difference of wet and dry bulb Ther., 37.5°. |
| | | | 8.00 a. m. | 66.9 | 53.0 | 13.9 | | |
| | | | 10.00 a. m. | 80.1 | 55.7 | 24.4 | 157.7 | |
| | | | 12.00 m. | 87.7 | 61.0 | 26.7 | 164.2 | |
| | | | 3.00 p. m. | 90.4 | 59.1 | 31.3 | 151.7 | |
| | | | 5.00 p. m. | 87.4 | 57.4 | 30.0 | 127.3 | |
| | | | 8.00 p. m. | 71.4 | 52.6 | 18.8 | | |
| Humboldt Valley, Oreana. | 4036 | Aug. 29 to Sept. 1. | 7.00 a. m. | 58.7 | 49.9 | 8.8 | | Continuation of similar weather. Mean Min., 47.5°. Mean Max., 96.2°. Max. difference of wet and dry bulb Ther., 33.7°. |
| | | | 10.00 a. m. | 79.8 | 56.2 | 23.6 | 157.5 | |
| | | | 12.00 m. | 87.0 | 59.5 | 27.5 | 162.7 | |
| | | | 2.00 p. m. | 90.2 | 61.1 | 29.1 | 173.2 | |
| | | | 7.00 p. m. | 71.1 | 57.1 | 14.0 | | |
| West Humboldt Mts., western base on mesa at mouth of canon. | 4881 | Sept. 4 to 11. | 7.00 a. m. | 57.7 | 41.2 | 16.5 | | Evaporation in exposed vessel in 24 hours, .5335′; in tent shade, .2871′. |
| | | | 10.00 a. m. | 75.7 | 50.9 | 24.8 | | |
| | | | 12.00 m. | 82.0 | 53.6 | 28.4 | 163.3 | |
| | | | 2.00 p. m. | 84.1 | 54.0 | 30.1 | 154.7 | |
| | | | 7.00 p. m. | 69.7 | 46.8 | 22.9 | | |
| West Humboldt Mts., eastern side at Unionville within mouth of canon. | 5169 | Oct. 9 to 12. | 7.00 a. m. | 53.6 | 41.3 | 12.3 | | |
| | | | 9.00 a. m. | 62.1 | 48.8 | 13.3 | 161.8 | |
| | | | 12.00 m. | 67.5 | 48.8 | 18.7 | 171.9 | |
| | | | 3.00 p. m. | 69.6 | 50.4 | 19.2 | 162.7 | |
| | | | 5.00 p. m. | 62.2 | 48.2 | 14.0 | | |
| Humboldt Valley..... | 4190 | Oct. 15 to 25. | 7.00 a. m. | 34.8 | 28.9 | 5.9 | | Mean of 7 morning readings. Mean Min., 22.2°. Lowest Min., 4.8°. |
| | | | 8.00 a. m. | 41.1 | 32.9 | 8.2 | | |
| Truckee Valley, Glendale. | 4372 | May 10 | 9.00 a. m. | 57.6 | 46.6 | 11.0 | 133.2 | Frost. |
| | | | 12.00 m. | 65.6 | 48.5 | 17.1 | 134.5 | |
| | | | 3.00 p. m. | 69.4 | 48.3 | 21.1 | 129.0 | Maximum, 77.5°. |
| | | | 7.00 p. m. | 64.8 | 46.8 | 18.0 | | |
| West Humboldt Mts., Unionville. | 5169 | June 5 to 7. | 6.00 a. m. | 51.4 | 44.4 | 7.0 | | |
| | | | 10.00 a. m. | 63.5 | 48.9 | 14.6 | 118.1 | |
| | | | 1.00 p. m. | 67.4 | 48.3 | 19.1 | 131.6 | |
| | | | 6.00 p. m. | 64.4 | 47.8 | 16.6 | | |

1. *Thermometrical observations*—Continued.

| Station. | Altitude. | Date. | Hour. | Dry bulb. | Wet bulb. | Difference. | Black bulb. | Notes. |
|---|---|---|---|---|---|---|---|---|
| | | | | °F. | °F. | °F. | °F. | |
| Same Station.......... | | June 20 | 6.00 a. m. | 65.1 | 52.7 | 12.4 | 88.8 | |
| | | to 21. | 10.00 a. m. | 76.0 | 57.6 | 18.4 | 142.2 | |
| | | | 1.00 p. m. | 80.6 | 56.1 | 24.5 | 145.8 | |
| | | | 6.00 p. m. | 74.2 | 53.9 | 20.3 | 134.4 | |
| Summit Springs....... | 5000+ | June 28 | 6.00 a. m. | 58.8 | 49.4 | 9.4 | 113.0 | Minimum, 42.7°. |
| | | | 10.00 a. m. | 76.3 | 52.1 | 24.2 | 160.6 | |
| | | | 1.00 p. m. | 80.8 | 51.6 | 29.2 | 153.2 | Maximum, 83.0°. |
| | | | 6.00 p. m. | 75.2 | 49.6 | 25.6 | 134.6 | |

2. *Thermometrical observations at stations in the valleys of Eastern Nevada.*

| Station. | Altitude. | Date. | Hour. | Dry bulb. | Wet bulb. | Difference. | Black bulb. | Notes. |
|---|---|---|---|---|---|---|---|---|
| Smoky Valley........ | 5600 | July 7 | 2.00 p. m. | 82.0 | 57.5 | 24.5 | | Partially clouded, with rain in the south and east. |
| | | | 6.00 p. m. | 68.4 | 55.7 | 12.7 | | |
| | | 8 | 5.00 a. m. | 44.8 | 42.3 | 2.5 | | Clear. Heavy dew. Min., 36.6°. |
| Monitor Valley....... | 5600 | | 10.00 a. m. | 76.8 | 60.6 | 16.2 | | Clouded. |
| | | | 2.00 p. m. | 76.1 | 57.6 | 18.5 | | |
| Ruby Valley on mesa line at base of East Humboldt Mts. | 6300 | July 12 to 26. | 7.00 a. m. | 66.3 | 56.2 | 10.1 | | Means of 11 days' readings. Mean Min., 41.7°. Mean Max., 85.5°. Lowest Min., 21.6°. Highest Max., and the extreme of the season, 90.5°. |
| | | | 10.00 a. m. | 78.3 | 58.2 | 20.1 | 151.8 | |
| | | | 2.00 p. m. | 80.9 | 57.0 | 23.9 | 150.4 | |
| | | | 7.00 p. m. | 70.3 | 51.3 | 19.0 | | |
| Huntington Valley.... | 6000+ | Aug. 20 & 21. | 7.00 a. m. | 66.6 | 50.9 | 15.7 | | |
| | | | 12.00 m. | 79.3 | 55.9 | 23.4 | | |
| Thousand Spring Valley. | 6000 | Sept. 27 | 7.00 a. m. | 67.6 | 49.4 | 18.2 | | Mean Min. from Sept. 20 to Oct. 8, 24.4°; lowest Min., 3.0°. |
| | | | 3.00 p. m. | 81.2 | 55.2 | 26.0 | | |
| | | | 6.00 p. m. | 60.2 | 46.4 | 13.8 | | |

3. *Thermometrical observations on peaks in Northern Nevada.*

| Station. | Altitude. | Date. | Hour. | Dry bulb. | Wet bulb. | Difference. | Black bulb. | Notes. |
|---|---|---|---|---|---|---|---|---|
| Virginia Mountains... | 7230 | July 30 | 12.00 m. | 81.6 | 55.5 | 26.1 | 134.5 | |
| | 8360 | Aug. 17 | 11.00 a. m. | 68.3 | 45.2 | 23.1 | 116.0 | Wind west, fresh. |
| West Humboldt Mts.. | 9021 | Sept. 12 | 1.00 p. m. | 54.0 | 34.0 | 20.0 | 127.6 | Wind west, very strong. |
| | 9882 | 19 | 1.00 p. m. | 44.7 | 34.5 | 10.2 | 137.0 | Clear. Wind east, strong. |
| | | | 3.15 p. m. | 45.4 | 35.4 | 10.0 | 142.5 | |
| | 9095 | 21 | 12.30 p. m. | 60.8 | 43.4 | 17.4 | 138.0 | Wind east, light. |
| Pah-Ute Mountains... | 7423 | 23 | 12.00 m. | 74.4 | 49.2 | 25.2 | 152.0 | Wind south, fresh. |
| | 8238 | 27 | 2.30 p. m. | 66.6 | 51.3 | 15.3 | 133.5 | Wind south, fresh. |
| | 7997 | Oct. 1 | 1.30 p. m. | 64.6 | 43.8 | 20.8 | 120.5 | Wind west, strong. |
| | 8432 | 2 | 4.30 p. m. | 48.7 | 35.2 | 13.5 | | Wind south, fresh. |
| Lake Range........... | 8140 | Nov. 13 | 1.00 p. m. | 45.3 | 35.2 | 10.1 | 128.0 | Wind south, fresh. |
| Havallah Mountains.. | 9314 | June 25 | 5.30 p. m. | 36.7 | 30.6 | 6.1 | | Clear. Wind west, strong. |
| Battle Mountains..... | 8530 | 30 | 2.00 p. m. | 64.9 | 43.3 | 21.6 | 127.6 | Clear. Wind west, strong. |
| East Humboldt Mts... | 9000 | July 27 | 3.00 p. m. | 61.0 | 47.4 | 13.6 | | Cloudy. Wind south, light. |
| | 8000 | 30 | 11.00 a. m. | 73.2 | 59.8 | 13.4 | ........ | Wind east, light. |
| | 8500 | Aug. 4 | 1.00 p. m. | 62.8 | 46.7 | 16.1 | ........ | Wind west, very strong. |
| | 8000 | 6 | 11.00 a. m. | 61.8 | 42.0 | 19.8 | ........ | Clear. Wind west, fresh. |
| | 9000 | 18 | 9.00 a. m. | 66.2 | 45.0 | 21.2 | ........ | Wind east, moderate. |
| | 10000 | | 12.00 m. | 54.5 | 38.0 | 16.5 | | Very hazy. Wind east, moderate. |
| | 8000 | 21 | 1.00 p. m. | 72.3 | 51.3 | 21.0 | ........ | Nearly clear. Wind east, fresh. |
| Clover Mountains..... | 10954 | Sept. 7 | 3.30 p. m. | 43.2 | 37.5 | 5.7 | | Wind west, fresh. |
| | 8098 | 11 | 7.00 p. m. | 41.6 | 32.4 | 9.2 | | In canon, clear. Wind east, light. |
| | | 12 | 7.30 a. m. | 45.0 | 37.7 | 7.3 | | Clear. Min., 26.0°. |
| | 8942 | 14 | 7.30 a. m. | 42.8 | 32.6 | 10.2 | | Head of canon, clear. Wind west, moderate. |
| | 11060 | | 12.00 m. | 49.8 | 39.0 | 10.8 | | Clear. Wind west, fresh. |

The degree of dryness of the air is also shown by the results of a series of careful measurements of the actual amount of evaporation taking place in vessels of water exposed to the full influence of sun and wind. The portion of these measurements made during fifteen days in June, fifteen days in July, and fourteen days in August, 1868, give very closely approximating means, and a general average daily evaporation of .5107 inches. Of this amount .4019 inches, or very nearly four-fifths, were evaporated between 6.00 A. M. and 6.00 P. M. The maximum evaporation for any hour observed was .0607 inches, and the largest amount recorded during any six hours is .3333 inches between 10 A. M. and 4 P. M., as shown in the following readings for July 23d, at Camp Ruby.

*Record of Evaporator; Camp Ruby, July* 23, 1868.

| Hour. | Evaporator reading. | Amount evaporated. | Thermometer. | | | | Clouds. | Wind. | Notes. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Dry bulb. | Wet bulb. | Difference. | Black bulb. | | | |
| | *In.* | *In.* | °F. | °F. | °F. | °F. | | | |
| 6.20 a. m. | .2690 | ........ | 65.4 | 59.3 | 6.1 | ........ | Clear. | East, light. | |
| 8.03 | .2963 | .0273 | 77.0 | 61.2 | 15.8 | 146.6 | Clear. | East, light. | |
| 9.00 | .3203 | .0240 | 80.4 | 61.7 | 18.7 | 155.2 | Clear. | East, light. | |
| 10.00 | .3604 | .0401 | 82.0 | 58.9 | 23.1 | 165.2 | Clear. | North, light. | |
| 11.00 | .4182 | .0578 | 85.3 | 55.2 | 30.1 | 167.0 | Clear. | North, light. | |
| 12.00 m. | .4746 | .0564 | 85.6 | 55.6 | 30.0 | 167.0 | Clear. | East, moderate. | |
| 1.00 p. m. | .5326 | .0580 | 87.0 | 55.3 | 31.7 | 168.8 | Clear. | East, fresh. | |
| 2.00 | .5876 | .0550 | 84.8 | 54.6 | 30.2 | 169.0 | Clear. | Northeast, light. | |
| 3.00 | .6426 | .0550 | 84.2 | 55.0 | 29.2 | 155.0 | Clear. | Northeast, moderate. | Maximum, 89.2°. |
| 4.00 | .6937 | .0511 | 82.8 | 54.7 | 28.1 | 156.2 | Clear. | Northeast, light. | |
| 5.00 | .7257 | .0320 | 81.7 | 55.8 | 25.9 | 146.0 | Clear. | East, light. | |
| 6.00 | .7440 | .0183 | 78.0 | 52.4 | 25.6 | ........ | Clear. | West, fresh. | |
| 7.03 | .7644 | .0204 | 76.4 | 52.0 | 24.4 | ........ | Clear. | North, moderate. | |
| 8.18 | .7915 | .0271 | 75.0 | 52.2 | 22.8 | ........ | Clear. | West, fresh. | |
| 9.00 | .8021 | .0106 | 69.0 | 51.8 | 17.2 | ........ | Clear. | West, light. | |
| 10.03 | .8183 | .0162 | 69.3 | 51.0 | 18.3 | ........ | Clear. | West, light. | |
| 11.00 | .8327 | .0144 | 67.6 | 50.4 | 17.2 | ........ | Clear. | West, light. | |
| 6.35 a. m. | .8823 | .0496 | 67.2 | 58.3 | 8.9 | ........ | Clear. | East, very light. | Minimum, 45.4°. |

General Character of the Vegetation. The following statements are based upon the results of field-work in Nevada in 1867 and 1868 and in Utah in 1869. Entering Nevada from California, collection was commenced on the 16th of July, 1867, in the valley of the Truckee River by Mr. W. W. Bailey, botanist of the expedition, and was continued through the season but confined wholly to the district between the Virginia and Pah-Ute Mountains. The summer was already so far advanced that the earlier vegetation had dis-

appeared and little was left to reward the collector. Some gleanings were however made, especially in the West Humboldt Mountains and in the bottoms and sinks of the Truckee, Carson, and Humboldt Rivers. During the winter Mr. Bailey's continued ill-health induced his return to the east, and on the opening of spring the duties of botanical collector were, among others, given to the undersigned. Begun at Carson City and the base of the Washoe Mountains during April and early May, 1868, the work was continued until the middle of June through the Trinity, West Humboldt, and Pah-Ute Mountains and the intervening valleys, and thus a fair collection was obtained of the evanescent spring flora of this region. Leaving Unionville on the 22d of June the route lay with but short delays across the Pah-Ute and Havallah Mountains and down Regan's Valley to Cumberland City, then to the Battle Mountains and mouth of Reese River and up Reese Valley to Austin in the Toyabes. It thence followed the Overland Stage Road across Smoky and Monitor Valleys and eastward to Ruby Valley. From the 11th July to the 24th of August the main camp near Fort Ruby was the center from which collections were made in the East Humboldt Mountains and the adjacent valleys, continued from that date until the 20th of September in the northern and higher portions of the range, including the Clover Mountains. Passing thence through Humboldt Pass into Holmes Creek and Thousand Spring Valleys, and by the Old Emigrant Road through Goose Creek Valley and the upper valley of Raft River and around the northern end of Great Salt Lake, work was closed at Ogden City on the 8th of October.

The next season's collection was begun at Salt Lake City on the 17th of May, but was much interrupted during the first ten days by continued rains. From the 2d to the 22d of June was spent upon Salt Lake and its shores and islands. Camp was then made in Parley's Park in the Wahsatch Mountains, 25 miles from Salt Lake City, and the remainder of the summer till the 29th of August was passed in different parts of the Wahsatch between this point and Echo Cañon on the north, and Provo River on the south, with the exception of two weeks, from the 30th July to the 13th of August, spent in the Uintas at the head of Bear River. A brief trip was also made early in July to the divide between the Provo and Duchesne Rivers in the same mountains.

It will be seen by reference to the map that opportunity was thus given for a more or less thorough examination of quite a large portion of the region

embraced within the limits of the survey, and for securing a somewhat complete collection of the plants peculiar to the different sections as well as seasons.

As the area of the territory explored is occupied in nearly equal proportions by the mountain ranges and intervening valleys, so we find the vegetation divided into two corresponding well-marked sections, which it will be best to consider separately. In order also to arrive at the Basin flora proper it will be necessary to distinguish those species which are peculiar to the extreme eastern and western bounding walls of the Basin, to the Washoe Mountains in Western Nevada as belonging rather to the flora of the Sierras and California, and to the Wahsatch and Uintas upon the east as a part of the somewhat distinct Rocky Mountain flora. Omitting, moreover, those plants which have as yet been found only in the southern portions of Nevada and Utah and which belong chiefly to the more desert region of Arizona and Southern California, the remaining species of the Catalogue may be considered as giving a fair though by no means complete representation of the flora of this section of the Great Basin.

No portion of this whole district, however desert in repute and in fact, is destitute of some amount of vegetation even in the driest seasons, excepting only the alkali flats, which are usually of quite limited extent. Even these have frequently a scattered growth of *Sarcobatus* or *Halostachys* surmounting isolated hillocks of drifted sand, compacted by their roots and buried branches. This vegetation covering alike the valley plains, the graded incline of the mesas, the rounded foothills and the mountain slopes, possesses a monotonous sameness of aspect and is characterized mainly by the absence of trees, by the want of a grassy greensward, the wide distribution of a few low shrubs or half-shrubby plants to the apparent exclusion of nearly all other growth, and by the universally prevalent gray or dull olive color of the herbage.

To the absence of trees there seems to be but a single exception, in the valley of the Truckee, where *Populus monilifera* and *trichocarpa* grow in considerable numbers in the river bottom. Upon the Humboldt and Carson Rivers they are rarely found, and in the higher eastern valleys the willow-leaved *P. balsamifera* of the mountains scarcely ever follows the streams beyond the limit of the foothills. So as respects the second of the characteristics mentioned, the turfing "buffalo" or "grama" grasses, which make

the plains east of the Rocky Mountains a vast pasture for the bison, deer, and antelope, are here unknown. There are, indeed, various other species more or less abundant in localities, but always growing in sparsely scattered tufts and dying away with the early summer heats, or to be then found only in favored spots in the mountain cañons. The two or three species that may be said to mat into a sward are confined to alkaline meadows and are nearly worthless for pasturage.

Of the more predominant species which form the mass of the shrubby and perennial vegetation of the entire region some are confined almost wholly to the more saline localities. Of these the *Halostachys occidentalis*, abundant about the sinks of the Carson and Humboldt Rivers and other similar places, is an exclusively alkaline shrub, growing where almost no other plant will. Much more widely distributed and abundant is the *Sarcobatus vermiculatus*, found nearly everywhere in the lower valleys where there is a decided amount of alkali, but rarely extending beyond such limits. The more frequent plants accompanying these are *Salicornia herbacea* and several species of *Suæda*, and other mostly Chenopodiaceous plants, and if there are grasses at all, *Brizopyrum spicatum* and *Spartina gracilis*.

On the somewhat less alkaline and drier portions of the valleys are found in frequent abundance *Obione confertifolia* and *canescens* or the nearly as common *Grayia polygaloides*, and rather less abundantly *Artemisia spinescens*, *Eurotia lanata*, and *Kochia prostrata*. Sometimes mingled with them, but wholly free from alkaline preferences and beyond their range usurping entire predominence, is the "everlasting sagebrush," the *Artemisia tridentata*. This is by far the most prevalent of all species, covering valleys and foothills in broad stretches farther than the eye can reach, the growth never so dense as to seriously obstruct the way but very uniform over large surfaces, very rarely reaching the saddle-height of a mule and ordinarily but half that altitude.

The "Broom-sage," *Linosyris graveolens*, sometimes occurs in considerable abundance along the dry valleys, often accompanied by *Tetradymia canescens*, but upon the gravelly foothills the smaller *L. viscidiflora* is much more frequent. Here the *Artemisia tridentata* is occasionally associated with or yields to the similar but smaller species *A. trifida*. On the foothills only and not ascending above the base of the mountains *Purshia tridentata* is widely distributed, and of frequent occurrence with it in Western Nevada are

*Ribes leptanthum* and *Prunus Andersonii*. *Ephedra antisyphilitica* is likewise abundant westward and especially southward.

Along the fresh water streams there are some other species prominent as shrubs, especially the willows, *Salix longifolia* and *cordata* in several strongly marked varieties, less frequently *Rosa blanda*, and still more rarely *Shepherdia argentea* and *Ribes aureum*. The marshes and margins of the lakes may be green with *Juncus Balticus* and *Scirpus validus* or *maritimus*, or sometimes with *Equisetum hiemale*, and the coarseness of the meadow herbage tempered to some extent by a growth of *Vilfa depauperata* or *Triticum repens*. The more generally abundant herbaceous plants upon the foothills are in their seasons the grasses *Poa tenuifolia* and *Hordeum jubatum*, as also the more persistent *Eriocoma cuspidata*, with *Sisymbrium canescens* and *Lupinus flexuosus*, replaced eastward by *sericeus*. In general the minor flora is marked by a prevalence of species of *Astragalus*, *Œnothera*, *Gilia*, *Hydrophyllaceæ*, annual *Eriogoneæ* and ligulate and senecioid composites.

The more generally predominant of the above mentioned shrubby species may be thus arranged approximately in the order of their frequency.

*Predominant Species.*

| | | |
|---|---|---|
| Artemisia tridentata. | Grayia polygaloides. | Eurotia lanata. |
| Obione confertifolia. | Halostachys occidentalis. | Purshia tridentata. |
| canescens. | Linosyris graveolens. | Ephedra antisyphilitica. |
| Sarcobatus vermiculatus. | Artemisia trifida. | Tetradymia canescens. |
| Linosyris viscidiflora. | spinescens. | |

All of these are strictly western species, *Obione canescens* and *Eurotia* alone being found east of the Rocky Mountains upon the plains. Most of them cross the line of the Sierras and appear upon the Pacific slope, and all excepting the two species mentioned and *Artemisia trifida* and *spinescens* pass southward to Arizona, New Mexico or Western Texas, and *Obione confertifolia* into Mexico. *Tetradymia* and *Eurotia* are the only ones reported from north of latitude 49°, the one from British Columbia, the other from the Saskatchewan.

The mountains are in a large measure as destitute of trees as the valleys, or even more naked from the dwarfed character of the shrubs upon the exposed ridges and summits. There is generally, however, upon limited portions of all but the lowest ranges from the Sierras to the Wahsatch a greater or less supply of *Pinus monophylla* or *Juniperus occidentalis*. These are usually scattered over the dry slopes, of low compact habit, rarely ex-

ceeding 10 or 15 feet in height, and confined to a belt of about 2,000 feet in width between the altitudes of 5,000 and 7,000 feet above the sea. In the principal ranges the Mountain Mahogany, *Cercocarpus ledifolius*, is also of frequent occurrence, but limited to an elevation of 6,000 to 8,000 feet. This too is only a small tree, very rarely 40° high, perferring the rocky ridges and dry mountain sides. On the stream banks in the upper cañons the "Quaking Asp," *Populus tremuloides*, is usually found, mostly small, but sometimes growing sufficiently large to answer for telegraph poles. In the Shoshone Mountains the Willow-leaved Poplar, *Populus balsamifera*, Var. *angustifolia*, was first met with and occurs abundantly in some cañons of the higher portion of the East Humboldt range, becoming a handsome tree 60 feet high. In the Washoe Mountains in common with the rest of the Sierras there is a heavy growth of several species of conifers, of which *Pinus ponderosa* extends down to the very base or even on to the valley slopes. A few scattered trees of the same species were also seen on the northern part of the Virginia Mountains, but for more than a hundred miles to the eastward other *Coniferæ* than the Nut Pine and Juniper already mentioned appear to be wholly wanting. In the southern Toyabe Mountains some pines and firs are found, probably the same species as those of the East Humboldt range. Here *Pinus flexilis* was met with in considerable numbers in the cañons, ranging from near the base to the higher divides and slopes, where also were a few specimens of *P. Balfouriana*, while in some of the high western cañons there is a dense growth of *Abies Engelmanni*. The last is probably the tree which gives its name to the White Pine District. On these mountains the alpine form of *Juniperus communis* occurred for the first time, and also *J. Virginiana*, of more slender and straighter habit than *J. occidentalis* and preferring more shaded and damper localities. In the Goose Creek Mountains *Abies grandis* was found occupying some of the moister cañons, which completes the list of the known trees of these central mountain ranges.

But in no case do these species cover more than very limited portions of the mountains, within the cañons, mostly much scattered, and probably never exceeding 40 or 50 feet in height. For the most part also they have been of exceedingly slow growth, are very knotty and cross-grained and make but poor timber. This is especially true of the pines. An extreme instance of the contortion that is occasionally seen in most of these species

was noticed in a dead branch, eight inches in diameter, apparently of *Pinus monophylla*, found in the East Humboldt Mountains. Here the decay of the bark and drying of the wood revealed very plainly the course of the fibres, which in a length of seven feet made four complete circuits. In some portions the direction was very nearly at right angles to the axis of the branch, and the length of the outer series of fibres must have been at least ten feet.

An opportunity was offered at the saw-mill in Ruby Valley of ascertaining the age and dimensions of several specimens of *Pinus flexilis* from the upper cañons of the East Humboldt Mountains. The following table gives the length and end-dimensions of the "cuts," and the width of each series of fifty rings from the outside toward the center. A comparison of these last measurements shows great uniformity of growth in the different periods, indicating a like uniformity in the conditions of temperature and moisture. To these are added a few measurements of *Artemisia tridentata* and *Purshia*, also made in Ruby Valley, besides which may be mentioned a *Juniperus occidentalis* twelve inches in diameter with 250 rings and a *Cercocarpus ledifolius* about two feet in diameter with 160 rings.

*Measurements of Tree and Shrub Growth.*

| Pinus flexilis. | | | | | | | | | | | | | Artemisia tridentata. | | Purshia tridentata. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length of cut. | Larger diameter. | Smaller diameter. | Number of rings. | Width of outer fifty rings. | Second. | Third. | Fourth. | Fifth. | Sixth. | Seventh. | Eighth. | Remainder. | Diameter. | Rings. | Diameter. | Rings. |
| *Feet.* | *In.* | *In.* | | *In.* | *In.* | *In.* | *In.* | *In.* | *In.* | *In.* | *In.* | *In.* | *In.* | | *In.* | |
| 12. | 26. | 22. | 486 | .7 | 1.0 | 1.0 | 1.3 | 1.1 | 1.0 | 1.9 | 1.6 | 3.4 | 8.0 | 65 + | 4.3 | 36 |
| 19. | 26. | 13.5 | 462 | 1.0 | 1.0 | 1.25 | 1.5 | 1.2 | 1.0 | .9 | 2.25 | 2.9 | 5.5 | 58 | 3.0 | 61 |
| 12.5 | 30.5 | 22. | 444 | .75 | 1.0 | 1.0 | 1.5 | 1.1 | 1.2 | 2.6 | 3.7 | 2.4 | 4.5 | 35 | ...... | ........ |
| 14. | 30. | 22. | 400 | 1.3 | 1.7 | 1.5 | 2.4 | 2.6 | 3.1 | 1.4 | 1.0 | ...... | 4.0 | 37 | ...... | ........ |
| 6. | 19. | 14. | 400 | .75 | .75 | 1.0 | .7 | 1.1 | 1.5 | 1.7 | 2.0 | ...... | 3.0 | 38 | ...... | ........ |
| 7. | 34. | 32. | 357 | 1.8 | 1.8 | 2.1 | 2.0 | 2.1 | 3.0 | 3.6 | .6 | ...... | 2.5 | 19 | ...... | ........ |
| 10. | 16. | 11. | 233 | 1.6 | 1.8 | 2.0 | 1.5 | 1.1 | ...... | ...... | ...... | ...... | 2.5 | 15 | ...... | ........ |

When the cañons in the mountains are dry the vegetation in them differs little from that of the intervening ridges, but in the presence of moisture and especially upon the sides of the higher cañons there is frequently a considerable amount of shrubby or perennial herbaceous growth. The most common species are *Ceanothus velutinus*, forming dense and tangled patches at an altitude of from 7,000 to 9,000 feet, *Ribes cereum* scattered over all the

mountain sides from base to summit, *Amelanchier Canadensis* and *Symphoricarpus montanus* of equally wide range but in rather moister localities, and also *Prunus demissa*, but confined to the neighborhood of streams. On the stream-banks in the lower cañons may be *Ribes irriguum*, *Rosa*, and various willows, with *Sambucus glauca* and *Cornus pubescens*, or more rarely *Cratægus rivularis* or *Alnus incana.* Equally conspicuous with any of these and covering abundantly the moist rich hillsides are *Wyethia amplexicaulis*, *Lophanthus urticæfolius*, and *Geranium Richardsonii.*

The mountain flora shows a larger number of shrubby species than that of the valleys, though many of them are very sparingly distributed. Among the herbaceous species there is a marked predominance of certain orders, genera, or sections of genera, mostly perennials, especially of *Pentstemon*, *Eriogonum*, *Lupinus*, *Castilleia*, and various Asteroid and Caryophyllaceous, Saxifragaceous and Umbelliferous genera. The number of alpine and subalpine plants is proportionally very large.

VALLEY FLORA. It is evident that the vegetation of the valleys may be readily divided into three very distinct groups, the first including species characteristic of the more alkaline localities, the second confined to the fresh-water aquatic and meadow species, and the last and much the larger class including the plants peculiar to the drier portions of the valleys and to the foothills. The strictly or chiefly alkaline species, as included in the following list, are neither numerous nor, with a few exceptions, very frequent. The first division (*a.*) is restricted to such as have been found, so far as known, only within the limits of the Great Basin, (taking that term in its larger sense.) The second division (*b.*) includes all those that extend beyond those limits but not (or rarely) eastward of the Saskatchewan and Mississippi Rivers, the first section, indeed, only westward to the Pacific slope, the second only eastward into the Rocky Mountains, or beyond, toward the Saskatchewan or Texas, and the last in both directions. In the third division (*c.*) are placed those species that are found in the Atlantic States or Eastern British America, the last section containing the few species that do not also pass to the Pacific side of the continent. The arctic species and those which extend beyond latitude 55° toward the arctic circle are designated by (Arc.) and (Subarc.) respectively. Southern species, found in Arizona, Southern California or Mexico, are indicated by (S.) or (Mex.,) while an (R.) notes such of the last two sections of division (*b.*) as do not cross the

Rocky Mountains. The same method of arrangement is followed in the subsequent lists.

*Alkaline Species.*

(*a.*)

Arabis longirostris.
Thelypodium Nuttallii. S.
sagittatum.
Cleomella parviflora. S.
plocasperma.
longipes. Mex.
Astragalus pterocarpus.
Ivesia Kingii.
Aster Nuttallii.
Aplopappus tenuicaulis.
Crepis Andersonii.
Cressa Cretica. Mex.
Lycium Andersonii.
Erythræa Nuttallii.
Monolepis pusilla.
Obione phyllostegia.
pusilla.
Kochia prostrata.
Schoberia occidentalis.
Halostachys occidentalis.
Fimbristylis thermalis.

(*b.*)

Lepidium montanum. Mex.
Nitrophila occidentalis.
Milla maritima.

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Monolepis chenopodioides. S.
Suæda depressa.
fruticosa. S. R.
Vilfa asperifolia. R.
Spartina gracilis.

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Aplopappus lanceolatus.
Eritrichium Californicum. Mt. S.
Blitum polymorphum.
Obione argentea.
Sarcobatus vermiculatus. S.
Euphorbia serpyllifolia.
Vilfa depauperata.

(*c.*)

Ranunculus Cymbalaria. Mt Arc.
Spergularia media. Mt. Subarc.
Heliotropium Curassavicum. Mex.
Suæda maritima.
Triglochin maritimum. Arc.
palustre. Subarc.
Scirpus maritimus. S.
Glyceria distans. Subarc.
Brizopyrum spicatum, var.
Panicum capillare.
dichotomum.

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Sesuvium Portulacastrum.
Salicornia herbacea.

The *Ranunculus*, *Eritrichium*, *Aster*, *Euphorbia* and *Panica* are not exclusively alkaline, and of these the first two are as often found in the mountains. *Spergularia media* was only collected at a salt spring in the Wahsatch and is added to complete the number of saline plants found, though not properly belonging in this list. The only shrubby or subshrubby species among them are the *Grayia*, *Halostachys*, *Sarcobatus*, *Lycium*, *Kochia*, and *Suæda fruticosa*.

There is a very much larger number of species belonging to the second group, aquatics or subaquatics, occupying the margins and banks of the lakes, springs and streams of purer water, or growing in the meadows or river bottoms in the near neighborhood of moisture—all properly fresh-water plants, though the localities in which they are found may often be to a considerable degree alkaline. Many of these are of course often found also on stream-banks in the cañons, while others which belong to the mountain flora occasionally follow the streams into the valleys; the first are indicated by (Mt.,) the last will be noted in the list of mountain plants. As might be expected they are generally of very wide range. But five species can be considered peculiar to the Great Basin, all little known and in some cases questionable. Fifteen species extend only westward and eight only eastward, while forty-three range from the Pacific slope toward the east, all but ten (R.) passing beyond the Rocky Mountains and nine approaching or crossing the arctic

circle. Of the still larger number (98) of the yet more eastern species thirty-six are arctic and seventeen subarctic, and seventy-eight range from the Pacific to the Atlantic. Those of division (*c.*) in italics are scarcely found south of the great lakes. Fourteen, at least, of the whole number extend into Mexico. Besides the two species of *Populus*, but six are even shrubby.

*Aquatic and Meadow Species.*

(*a.*)

Nasturtium lyratum.
Selinum Kingii.
Potamogeton marinus. Eu.
Scirpus Nevadensis.
Carex Watsoni.

(*b.*)

Trifolium variegatum. Mt. Mex.
fimbriatum. Mt.
cyathiferum. Mt.
Tillæa angustifolia.
Œnothera tanacetifolia.
Calais major.
Downingia pulchella.
Mimulus floribundus. Mt.
pilosus.
Castilleia affinis. Mt. Mex.
Hesperochiron Californicus.
Populus trichocarpa.
Iris Tolmieana.
Carex æmathorhyncha.
vesicaria.

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Bergia Texana.
Potentilla millegrana. S.
Aster adscendens. Mt.
Erigeron Bellidiastrum. Mt.
pumilum. Mt.
Plantago eriopoda. Subarc.
Shepherdia argentea.
Vilfa ramulosa. R.

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Nasturtium sinuatum. Mt. S.
obtusum. Mt.
Sidalcea malvæflora. Mex. R.
Thermopsis fabacea. Mt. R.
Glycyrrhiza lepidota. Mex.
Potentilla gracilis. Mt.
Nuttallii. Mt.
Parnassia parviflora. Mt. Lab.
Ribes aureum.
Gaura parviflora. S.
Galium asperrimum. R.
Aster angustus. Subarc.
falcatus. R. Arc.
Erigeron lonchophyllum. Mt.
glabellum. Subarc.
Solidago elongata. Mt. R. Arc.
occidentalis.
Iva axillaris.
Artemisia dracunculoides. Mt.
Ludoviciana. S.
Gnaphalium luteo-album.
palustre. S.
Senecio hydrophilus. R.
Cirsium Drummondii.
Stephanomeria exigua. R.
Crepis runcinata. Mt.
Mulgedium pulchellum. Arc.
Gentiana affinis.
Asclepias speciosa.
Rumex longifolius. Subarc.
Epipactis gigantea.
Zigadenus Nuttallii.
Juncus longistylis. Mt. S.
xiphioides. S.
Carex Douglasii. Mex.
marcida. Subarc.
athrostachya. R.
Jamesii.
Vilfa airoides.
Vaseya comata.
Elymus condensatus. R.
Aira danthonioides.
Beckmannia erucæformis. Mt. Arc.

(*c.*)

Ranunculus aquatilis. Arc.
sceleratus. Arc.
repens.
fascicularis.
Nasturtium palustre. Mt. Mex. Arc.
Cardamine hirsuta. Mt. Arc.
Viola cucullata. Mt. Arc.
Hosackia Purshiana. Mex.
*Geum macrophyllum.* Mt. Subarc.
Potentilla Anserina. Arc.
Rosa blanda. Mt. Arc.
Hippuris vulgaris. Mt. Arc.
Myriophyllum verticillatum. Mt.
Callitriche verna. Mt.
Ammannia latifolia. Mex.
Œnothera biennis. Mt. S. Subarc.
Cicuta maculata. S. Arc.
Sium lineare.
angustifolium.
Valeriana edulis.
Aster simplex.
æstivus. Arc.
Erigeron Canadense.
Solidago gigantea. Mt.
Helenium autumnale. Arc.
Sonchus asper. Mt.
Arctostaphylos Uva-ursi. Arc.
Dodecatheon Meadia. Mt. S. Arc.
Glaux maritima. Subarc.
Samolus Valerandi, var. Mex.
Utricularia vulgaris. Arc.
Gratiola Virginiana.
Veronica Anagallis. Subarc.
Americana. Mt. Subarc.
peregrina. Mt. Mex. Subarc.
Mentha Canadensis. Subarc.
Stachys palustris. Arc.
*Gentiana Amarella.* Alp.* Arc.
Menyanthes trifoliata. Subarc.
Apocynum cannabinum. Mt. Mex.
Rumex salicifolius. Arc.
maritimus.
Polygonum amphibium. Mex. Subarc.
Urtica dioica. Mt. Mex. Arc.
Populus monilifera.
Salix longifolia. Arc.
cordata. Arc.
Lemna trisulca.
minor.
Typha latifolia. Arc.
Potamogeton natans. Subarc.
pectinatus. Mex.
Alisma Plantago.
Sagittaria variabilis.
Sisyrinchium Bermudiana. Mt. Arc.
*Zigadenus glaucus.* Mt. Arc.
Juncus bufonius. Mt. Arc.
Balticus. Mt. Arc.
nodosus. S.
Cyperus inflexus.
phymatodes. S.
Eleocharis palustris. Arc.
acicularis.
Scirpus validus. S. Subarc.
Carex stipata. Arc.
*aurea.* Mt. Arc.
utriculata. Mt. Subarc.
Alopecurus aristulatus. Subarc.
Agrostis scabra. Mt. Subarc.
Muhlenbergia glomerata. Mt.
Calamagrostis stricta. Mt. Arc.
Glyceria aquatica. Mt.
Phragmites communis. Mt.
Triticum repens. Mt. Arc.
Hordeum pratense. Subarc.
Aira cæspitosa. Subarc.
Phalaris arundinacea. Mt. Arc.
Panicum Crus-galli.

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Elatine Americana.
Aster carneus.

Solidago nemoralis.
Utricularia minor. Arc.
*Gentiana detonsa.* Mt. Arc.
Rumex Britannica.
Ceratophyllum demersum.
Parietaria Pennsylvanica. Mt.
Lemna Valdiviana.
polyrrhiza.
Sparganium eurycarpum. Subarc.
Potamogeton lonchites.
gramineus. Arc.
perfoliatus. Arc.
Schollera graminea.
Scirpus Torreyi.
*Carex aristata.* Arc.
Agrostis elata. ?
Muhlenbergia sylvatica. ?
Eragrostis Purshii.

The remaining plants of the valley flora are those which in a much greater variety both of genera and species occupy the drier sandy or gravelly portions of the valleys and the foothills, and are consequently subject to a greater extreme of heat and drought. Many of them are low or dwarfed annuals, often varying much in size and habit with the circumstances of their growth, usually starting with the rains of autumn, flowering in early spring, and hastening to a quick maturity. With the first heats of summer they are burned away and speedily vanish. Others are stouter and hardier, frequently becoming more or less woody, or are biennials or perennials springing from bulbs or from thick and usually deepseated roots or root-stocks, and in the partial protection afforded by the larger shrubbery are able to maintain their growth till later in the season. By the middle of July, however, the far greater number have wholly disappeared and only the more woody based perennials are left, except in favored localities.

These comprise all the peculiarly "desert" species of this portion of the Basin. Of the entire number (305) one-third (94) are so far as known strictly confined to the Basin, and on the whole southern, quite a large number extending southward into the Mohave and Colorado deserts and half a dozen southeastward to New Mexico or even Western Texas. Another third (84,) the first section of division (*b* ), range only westward, some to Southern California but nearly one-half (38) to Oregon or Washington Territory, though only a single one, *Matricaria discoidea*, is reported from farther north. Of the 106 which are found in the Rocky Mountain region, 63 belong also to the Pacific slope and as many more pass east of the range, though only six are arctic or subarctic. There are also here at least 20 Mexican species and 53 others that have been collected in Arizona. Of the 21 still more eastern species in division (*c.*) five are not found upon the Pacific side and six reach the arctic or subarctic portions of the continent. About half extend into Mexico or Arizona. As many as in the last group (51) are noted as ascending above the foothills, but rarely to any great altitude. Only *Artemisia tridentata*, *Gilia congesta*, and one or two other species sometimes reach the summits of the higher ridges.

*Species of the Drier Valleys and Foothills.*

(*a.*)

Myosurus aristatus. S.
Ranunculus Andersonii.
Platyspermum scapigerum.
Stanleya viridiflora.
Caulanthus crassicaulis.
pilosus.
Lepidium dictyotum.
flavum. S.
nanum.
Cleome sparsifolia.
Calyptridium roseum.
Sphæralcea Emoryi. Mex.
Lupinus brevicaulis.
uncialis.
Dalea polydenia.
Astragalus Andersonii.
malacus.
arrectus.
iodanthus.
Beckwithii.
eriocarpus.
Utahensis. Mt.
oophorus.
nudus.
Chamæleuce. S.
Prunus Andersonii.
Œnothera glabella.
pterosperma.
Andina.
Mentzelia congesta.
Echinocactus Whipplei.
pubispinus.
Cereus Engelmanni. S.
Opuntia rutila.
hystricina.
pulchella.
Brickellia linifolia.
Helianthus Nuttallii.
Chænactis macrantha.
carphoclinia. S.
Burrielia nivea.
Tetradymia Nuttallii.
spinosa. S.
Anisocoma acaulis. S.
Stephanomeria pentachæta.
Glyptopleura marginata. S.
Phelipæa erianthera. Mex.
Antirrhinum Kingii.
Pentstemon Palmeri. S.
Orthocarpus Tolmiei.
pilosus.
Cordylanthus capitatus.
ramosus. Mt.
laxiflorus. Mex.
canescens.
Kingii.
Eritrichium Kingii.
micranthum. S.
Phacelia crenulata.
curvipes.
pusilla.
Phacelia Ivesiana.
bicolor.
gymnoclada.
crassifolia.
Emmenanthe glandulifera.
glaberrima. S.
Tricardia Watsoni.
Gilia subnuda. S.
Bigelovii. S.
polycladon.
leptomeria.
micromeria.
campanulata.
Oryctes Nevadensis.
Asclepias cryptoceras.
Mirabilis Californica. Mt. S.
Hermidium alipes.
Obione confertifolia. Mex.
Torreyi.
truncata.
Eriogonum nutans.
Watsoni.
pusillum.
Oxytheca dendroidea.
Watsoni.
perfoliata.
Chorizanthe brevicornu. S.
rigida. S.
Watsoni.
Allium Nevadense.
atrorubens.
anceps.
Eremochloe Kingii.

(*b.*)

Pæonia Brownii.
Eschscholtzia Californica. S.
Arabis arcuata.
Thelypodium brachycarpum.
laciniatum.
Capsella divaricata. S.
Thysanocarpus elegans. S.
Malvastrum Munroanum. Mex.
Sida hederacea. Mex.
Erodium cicutarium. S.
Lupinus flexuosus. Mt.
sericeus.
Hosackia Heermanni. S.
subpinnata.
Astragalus lentiginosus. S.
Purshii.
Œnothera deltoides. S.
viminea.
scapoidea. S.
Boothii.
alyssoides.
dentata. S.
Carum Gairdneri.
Ferula multifida. Mt.
Plectritis congesta. S.
Erigeron concinnum. M.
Balsamorrhiza Hookeri.
Helianthus exilis.
Chænactis Xantiana. S.
Rigiopappus leptocladus.
Blepharipappus scaber.
Layia glandulosa.
heterotricha.
Hemizonia Durandi.
Lagophylla ramosissima.
Madaria elegans.
Matricaria discoidea. Subarc.
Artemisia trifida. Mt.
Psathyrotes annua.
Tetradymia glabrata.
Lygodesmia spinosa.
Malacothrix Californica.
obtusa.
Macrorrhynchus heterophyllus.
grandiflorus.
Plantago Bigelovii.
Pentstemon deustus.
Eunanus Fremontii.
Bigelovii.
Orthocarpus hispidus.
Salvia Columbariæ. S.
Audibertia incana. Mt.
Amsinckia lycopsoides. Mex.
Piptocalyx circumscissus. S.
Eritrichium angustifolium. Mex.
fulvum.
leiocarpum. Mt.
pterocaryum. S.
Coldenia Nuttallii. S.
Phacelia Menziesii. Mt.
Conanthus aretioides.
Emmenanthe penduliflora.
parviflora.
Nama demissa.
Collomia leptalea.
Gilia androsacea.
micrantha.
ciliata.
Cuscuta Californica. Mt.
Nicotiana Bigelovii.
Mengea Californica.
Eriogonum gracile. S.
Heermanni.
Plumatella. S.
deflexum. S.
inflatum. S.
angulosum. S.
Euphorbia ocellata.
Ephedra antisyphilitica. Mt. S.
Zigadenus paniculatus.
Calochortus Nuttallii. Mt.
Allium tribracteatum. Mt.
Stipa occidentalis.
Festuca microstachya.

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Argemone Mexicana. Mex.
Lepidium Fremontii. S. R.
alyssoides. S. R.
Cleome aurea. R.
Polanisia uniglandulosa.

Malvastrum coccineum. Mex.
Astragalus Geyeri. R.
speirocarpus. Mt. R.
Nuttallianus. Mex.
Kentrophyta. R.
Œnothera triloba. Mt. Mex.
Opuntia Missouriensis. Mt.
fragilis.
Cymopterus montanus. Mt. S.
Peucedanum nudicaule. R.
Townsendia strigosa. S.
Diplopappus ericoides. Mex. R.
Erigeron cæspitosum.
Solidago pumila. R.
Artemisia spinescens. R.
Senecio Fendleri. R.
multilobatus. R.
Lygodesmia juncea.
Troximon cuspidatum.
Androsace occidentalis. Mex.
Pentstemon cæruleus.
Echinospermum Redowskii. Mt. S. Sub-[arc.
Phacelia integrifolia. Mex.
Gilia pumila.
Acerates decumbens. S.
Oxybaphus angustifolius. Mex.
Abronia fragrans. S.
cycloptera.
turbinata. R. S.
Chenopodium Fremonti.
hybridum.
Eriogonum acaule. R.
cernuum. S.
Stipa spartea. Mt.
comata. Mt.
Aristida purpurea. S.
Pleuraphis Jamesii.

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Delphinium Menziesii. Arc. R. S.
Stanleya pinnatifida. S.
Thelypodium integrifolium. R.
Lepidium intermedium. Arc.
Cleome integrifolia.
Lupinus pusillus. S.
aridus. R.
Psoralea lanceolata. S.
Ribes leptanthum. R.
Œnothera marginata. Mt. R.
albicaulis. Mex.
Mentzelia albicaulis. Mex. R.
lævicaulis. R.
Peucedanum macrocarpum. Mt.
Purshia tridentata. R. S.
Gutierrezia Euthamiæ. Mt. Mex.
Linosyris graveolens. R. S. Mt.
viscidiflora. R. Mt.
Grindelia squarrosa. Mt. Arc.
Chrysopsis villosa.
Ambrosia psilostachya.
Franseria Hookeriana.
Hymenoclea monogyra. Mex.
Balsamorrhiza sagittata. Mt. R.
Helianthus lenticularis. S.
Chænactis stevioides. R.
Artemisia tridentata. Mt. R. S.
Antennaria dimorpha. R.
Tetradymia canescens. Mt. R.
Calais linearifolia. Mex. R.
Stephanomeria minor. S.
paniculata. R.
Malacothrix sonchoides.
Crepis glauca.
Macrorrhynchus glaucus. Arc.
troximoides. Mt. R.
Plantago Patagonica, var. Mex.
Aphyllon fasciculatum. Mex.
Collinsia parviflora. Mt.
Pentstemon glaber.
acuminatus. Mex.
Mimulus rubellus. Mt. R.
Orthocarpus luteus. Mt.
Phacelia tanacetifolia. Mt. S.
Collomia gracilis. Mt. R. S.
Gilia nudicaulis. R.
Gilia pungens. Mt. S.
floccosa. Mt. R. S.
filifolia. Mt. S.
congesta. Mt. R.
inconspicua. S.
Cuscuta tenuiflora. S.
Nicotiana attenuata. R. S.
Obione canescens. S.
Grayia polygaloides. Mt. R. S.
Eurotia lanata.
Corispermum hyssopifolium. Arc. S.
Eriogonum sphærocephalum. R.
ovalifolium. Mt. R.
Wrightii. S.
Euphorbia dictyosperma.
Leucocrinum montanum. R.
Eriocoma cuspidata. Mt. S.
Poa tenuifolia. Mt. R.

(*c*.)

Myosurus minimus.
*Arabis retrofracta*. Arc.
Sisymbrium canescens. Mt. Mex. Arc.
Rhus aromatica, var. Mt.
Galium Aparine. Mex. Subarc.
Ambrosia artemisiæfolia.
Xanthium strumarium.
Chenopodium album. Mt. Arc.
Amarantus retroflexus.
albus.
Polygonum aviculare. Mt. Mex. Subarc.
tenue. Mt.
Celtis occidentalis. Mt.
Festuca tenella.
Hordeum jubatum.
Cenchrus tribuloides. Arc.

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Anemone decapetala.
Draba Caroliniana.
Helianthus giganteus.
Euphorbia glyptosperma.
Vilfa cryptandra.

Mountain Flora of the Basin. Of the 393 species collected exclusively in the mountain ranges lying within the limits of the Basin, fifty-five are as yet not known from beyond those limits, but of these the greater part are new or recent discoveries. Of the 252 other western species, seventy-eight belong to the Pacific slope, chiefly between the Sacramento and Columbia Rivers, three being arctic and two subarctic, fifty-six extend to or beyond the Rocky Mountains, of which sixteen are arctic and three subarctic, and 118 are found both east and west of the Basin, of which eleven are arctic and nineteen subarctic. Of the whole number about forty (E.) cross the Rocky Mountains, mostly to the Saskatchewan, eight are Mexican, and about twice as many more have been collected in Arizonia. A larger number have been found in the mountains of New Mexico. Of the eighty-six eastern

species, thirteen are not know on the Pacific side—of these five are arctic and three subarctic, and of the remainder forty-one are arctic and twelve subarctic. Six species are Mexican.

In determining the alpine or subalpine character of a species, exposure, altitude, and season have all been taken into account. In the absence in many cases of any forest growth to indicate the limit of arborescent vegetation and, independently of altitude or the protection of trees, the flora of any mountain locality being greatly influenced by a warm and sunny exposure or the opposite, the question has often been very much one of judgment, to be decided by no single arbitrary consideration. Species of doubtful rank as alpine, or evidently only approaching it, have been considered subalpine, and those that were also found at lower elevations than either term would imply are indicated by an asterisk. The number of alpine and subalpine species (114) equals that of the arctic and subarctic, but they are quite differently distributed, the large majority belonging to the second rather than the third division.

*Mountain Species of the Basin.*

(*a.*)

Ranunculus digitatus. Subalp.
Sisymbrium junceum.
Viola Beckwithii.
Lychnis nuda.
Stellaria Kingii.
Arenaria aculeata.
Claytonia umbellata.
Spraguea paniculata.
Lupinus meionanthus.
Dalea Kingii.
Astragalus diphysus. S.
calycosus. Alp.*
atratus.
obscurus.
Robbinsii, var. Subalp. Vt.
cyrtoides.
filipes.
porrectus.
tegetarius. Alp.
Cowania Mexicana. Mex.
Ivesia Baileyi.
Tellima tenella. S.
Sedum debile. Subalp.
Œnothera heterantha.
Opuntia sphærocarpa, var.
Cymopterus nivalis.
glaucus.
Selinum capitellatum.
Peucedanum Nuttallii.
millefolium.
graveolens. Subalp.
Galium bifolium.
Bloomeri.
Brickellia microphylla.
Aster Bloomeri.
asperugineus. Subalp.
pulchellus. Subalp.
Townsendia scapigera.
Diplopappus alpinus.
Erigeron Bloomeri.
Aplopappus acaulis.
Laphamia Stansburii.
Balsamorrhiza hirsuta.
Helianthella multicaulis.
Tanacetum canum.
Calais macrochæta. S.
Stephanomeria myrioclada.
Pentstemon Kingii.
Collomia tenella.
Gilia Watsoni.
Eriogonum Kingii. Alp.*
Fritillaria atropurpurea.
Calochortus eurycarpus.
Carex frigida. Subalp. Eu.
Poa (?) Kingii.

(*b.*)

Delphinium depauperatum.
Cheiranthus Menziesii.
Arabis platysperma.
Draba Douglasii.
nemorosa. Alp.* Val. Arc.
Sisymbrium Californicum. Subalp.*
Silene Douglasii.
Claytonia perfoliata. Subarc.
Spraguea umbellata.
Lewisia rediviva. S.
Ceanothus soredlatus.
Lupinus laxiflorus.
polyphyllus.
argenteus.
sulphureus.
Trifolium microcephalum.
Astragalus platytropis. Alp.
Cercocarpus ledifolius.
Potentilla glandulosa.
Cratægus rivularis. Val.
Saxifraga punctata. Arc.
Heuchera cylindrica, var. Alp.
Ribes bracteosum. Subarc.
Epilobium obcordatum. Subalp.
Clarkia rhomboidea.
Gayophytum diffusum.
Pimpinella apiodora.
Myrrhis occidentalis.
Cymopterus fœniculaceus.
Angelica Breweri.
Cornus pubescens.
Galium multiflorum.
Eupatorium occidentale.
Brickellia oblongifolia.
Aster Douglasii. Val.
elegans.
Erigeron Breweri. Subalp.
Solidago Canadensis.
Aplopappus Bloomeri.
nanus.
suffruticosus.
apargioides.
paniculatus.
Wyethia mollis.
Bahia leucophylla.

Madia racemosa.
Cirsium Coulteri.
Calais nutans. Subalp.* Va..
Hieracium Scouleri.
Heterocodon rariflorum.
Ledum glandulosum. Subalp.
Mimulus primuloides.
moschatus.
Monardella odoratissima. S.
Lophanthus urticæfolius.
Lithospermum pilosum. Val.
Hydrophyllum capitatum. Subalp.*
Phacelia humilis.
Gilia pusilla, var.
intertexta.
Breweri.
Asclepias fascicularis. S.
Eriogonum heracleoides. Subalp.*
Lobbii.
elatum.
vimineum.
spergulinum.
Polygonum polymorphum. Arc.
Pinus monophylla.
Sisyrinchium grandiflorum.
Fritillaria pudica.
Camassia esculenta.
Allium validum.
bisceptrum.
Juncus triformis.
Carex Liddoni.
Melica poæoides.
stricta.

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Thalictrum alpinum. Alp. Arc.
Ranunculus glaberrimus.
nivalis, var. Subalp. Arc.
Delphinium elatum, var.
Arabis canescens. Alp.
Vesicaria montana. Subalp.
Draba stellata. Alp. Arc.
muricella. Alp. Arc. Lab.
Smelowskia calycina. Alp. Arc.
Thlaspi alpestre. Alp.*
Silene acaulis. Alp. Arc. Wh. Mts.
Stellaria umbellata. Subalp. Subarc. E.
Arenaria Fendleri. S.
arctica, var. Alp. Arc.
Geranium Richardsonii. E.
Lupinus leucopsis.
Astragalus hypoglottis. Arc.
aboriginum. Alp.* Arc. E.
Hookerianus. Subalp.
junceus.
Geum Rossii. Alp.* Arc.
Potentilla pulcherrima.
Saxifraga adscendens. Alp.
Gayophytum ramosissimum. Val.
Echinocactus Simpsoni. E.
Cymopterus anisatus.
Peucedanum villosum. Val. E.
Hymenopappus tenuifolius. E.
Actinella acaulis. E.
Richardsonii. Val. E. S.
Artemisia arbuscula. Subalp.

Arnica longifolia. Subalp.
Senecio amplectens. Alp.
Primula Parryi. Alp.
Androsace septentrionalis. Alp.* Arc. E.
Pentstemon cristatus. E.
Castilleia linearifolia. Mex.
Limosella aquatica. Val.
Pedicularis Grœnlandica. Subalp.* Arc.
Scutellaria resinosa. Mex. E. [Lab.
Mertensia oblongifolia.
Sibirica.
paniculata. Alp.* Arc. E.
Eritrichium glomeratum. Subalp.* Val.
Phacelia sericea. [S. E.
Gentiana Parryi. Alp.*
Swertia perennis. Alp.* Subarc.
Salix glauca, var. Subalp. Arc.
reticulata. Alp. Arc. Lab.
Abies Engelmanni. Alp.*
Lloydia serotina. Alp. Arc.
Allium acuminatum.
Carex affinis. Alp. Subarc.
leporina. Alp.
Rossii.
Poa Andina. Alp.

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Clematis ligusticifolia. E. Mex.
Thalictrum Fendleri.
Ranunculus macranthus. E.
Caltha leptosepala. Alp.*
Aconitum nasutum.
Berberis Aquifolium.
Barbarea vulgaris. Arc. E.
Streptanthus cordatus. S.
Cardamine cordifolia.
Physaria didymocarpa. Subarc.
Draba alpina. Alp.* Arc.
Erysimum asperum. Alp.* Val. Sub-
Viola Nuttallii. Subalp.* E. [arc. E.
Silene Menziesii. Val. Subarc.
Stellaria Jamesii.
Arenaria pungens.
Talinum pygmæum. Alp.*
Claytonia Chamissonis. Subarc.
Hypericum Scouleri. Mex.
Sphæralcea acerifolia.
Pachystima Myrsinites.
Ceanothus velutinus.
Acer glabrum.
Trifolium longipes. S.
Astragalus multiflorus. E. S. Subarc.
Prunus demissa.
Spiræa dumosa.
cæspitosa. Mex.
Rubus Nutkanus. E.
Cercocarpus parvifolius.
Potentilla diversifolia. Alp.* Subarc.
Pyrus sambucifolius. Subarc.
Tellima parviflora.
Mitella pentandra.
Heuchera rubescens.
parvifolia.
Parnassia fimbriata. Subalp.* Subarc.
Ribes irriguum.
cereum. Subalp.*

Sedum stenopetalum.
Epilobium paniculatum.
Gayophytum racemosum. Subalp.*
Symphoricarpus montanus.
Sambucus glauca.
Lonicera involucrata. E. Subarc.
Brickellia grandiflora.
Californica.
Aster glacialis. Alp.
salsuginosus. Alp.* Subarc.
Machæranthera canescens. Val. E. S.
Erigeron compositum. Alp. Arc.
Linosyris Howardii.
Aplopappus Macronema. Alp.
Wyethia amplexicaulis.
Rudbeckia occidentalis.
Heliomeris multiflora. S.
Chænactis Douglasii. Alp.* Val. S.
Helenium Hoopesii.
Artemisia discolor. Subarc. E.
frigida. E.
Antennaria alpina. Alp. Arc. Lab.
Arnica Chamissonis. Subarc. E.
cordifolia. Subalp.* E.
Senecio lugens, var. Subalp.* E.
triangularis. Subarc.
Andinus.
canus. Alp.* E.
Cirsium undulatum. Val. Mex. E.
foliosum.
Crepis occidentalis.
acuminata. Val.
Pentstemon Fremonti.
humilis.
confertus. E.
Mimulus Lewisii. Subarc.
luteus. Subarc.
Veronica alpina. Subalp. Gr. Wh. Mts.
Castilleia parviflora. Subalp. S.
Echinospermum deflexum. E.
Hydrophyllum macrophyllum, var.
Phacelia circinata. S.
Phlox canescens.
cæspitosa. Alp.*
Douglasii.
longifolia. Val.
Collomia grandiflora. S.
linearis. Subarc. E.
Gilia liniflora.
Nuttallii.
aggregata. S. E.
Polemonium confertum. Alp.
Frasera speciosa.
Eriogonum cæspitosum.
umbellatum. Alp.* E.
microthecum. Alp.* E.
Oxyria digyna. Alp.* Arc. Wh. Mts.
Rumex venosus. Val. E.
Polygonum coarctatum. Subalp.* Arc.
Bistorta. Subalp. Arc.
Comandra pallida.
Pinus ponderosa.
Balfouriana. Alp.*
flexilis. Alp.*
Abies grandis.

Juniperus occidentalis. Val. S. E.
Luzula spicata. Subalp. Arc. Wh. Mts.
Juncus Parryi. Subalp. [Mex.
Mertensianus. Subarc.
Carex festiva. Subarc.
rigida. Subalp. Arc.
atrata. Alp.
Phleum alpinum. Subalp.* Arc. Wh. Mts.
Agrostis exarata. Subarc. S.
Calamagrostis sylvatica. Alp. Arc. E.
Stipa viridula. E.
Bromus breviaristatus.
Triticum strigosum.
Elymus Sitanion. Alp.* E.

(*c*.)

Anemone multifida. Subalp. Arc.
Ranunculus alismæfolius, var. Sabalp.
Aquilegia Canadensis, var. Arc.
Actæa spicata, var.
Corydalis aurea, var.
Arabis hirsuta. Arc.
perfoliata. Arc.
*Drummondii*. Alp.*
Erysimum cheiranthoides. Val. Arc.
Viola canina. Subarc.
Silene antirrhina.
Cerastium nutans.
Stellaria longipes. Arc.
crassifolia. Arc.
*Linum perenne*. Subalp.* Val. Arc.
Geranium Carolinianum. Mex.
Astragalus Canadensis.
Vicia Americana. Val. Arc.

Spiræa opulifolia.
Geum triflorum. S. Subarc.
Potentilla fruticosa. Subalp.* Val. Arc.
*procumbens*. Alp. Subarc. Gr.
Amelanchier Canadensis, var. S. Arc.
Saxifraga nivalis. Subalp.* Arc.
Ribes hirtellum.
lacustre. Alp. Arc.
Sedum Rhodiola. Alp.* Arc.
Epilobium alpinum. Subalp.* Arc.
tetragonum. Subarc.
angustifolium. Arc.
Heracleum lanatum. Subarc.
Galium triflorum.
boreale. S. Arc.
Valeriana dioica. Subarc.
Solidago Virga-aurea. Alp.* Arc.
Achillea Millefolium. Subalp.* Val. Arc.
Artemisia biennis. Arc. [Mex.
*Antennaria dioica*. Subalp.* Arc.
*Arnica angustifolia*. Arc.
*mollis*. Subalp.*
Senecio aureus. Val. Arc.
*Vaccinium cæspitosum*. Alp. Subarc.
Kalmia glauca, var. Alp. Arc.
Pyrola rotundifolia. Arc. Mex.
Scrophularia nodosa.
*Castilleia pallida*. Val. S. Arc.
Brunella vulgaris. Subarc.
Polemonium cæruleum. Val. Arc. Mex.
Calystegia sepium. Val.
Apocynum androsæmifolium.
*Polygonum viviparum*. Alp. Arc.
*Shepherdia Canadensis*. Arc.
Alnus incana, var. Val. Subarc.

Populus tremuloides. S. Arc.
balsamifera, var. Arc.
Juniperus communis, var. Alp. Arc.
Virginiana. Arc.
Habenaria hyperborea. Val. Arc.
dilatata. Arc.
Spiranthes Romanzoffiana. Val. Subarc.
Veratrum album. Arc.
Smilacina racemosa, var.
stellata. Val. S.
*Luzula spadicea*. Arc.
Scirpus microcarpus. Val.
Carex lanuginosa. Subarc.
*scirpoidea*. Alp. Arc.
Agrostis canina. Alp. Subarc. Gr.
Kœleria cristata.
Poa alpina. Alp.* Arc.
Bromus ciliatus. Arc.
Triticum caninum.
Trisetum subspicatum. Alp. Arc. Mex.

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Claytonia Caroliniana, var. Subalp. S.
Hypericum mutilum. ?
*Oxytropis campestris*. Alp. Arc.
Prunus Virginiana. Arc.
Rubus strigosus. Subalp.* Subarc.
Potentilla Pennsylvanica, var. Arc. ?
Solidago stricta.
*Antennaria Carpathica*. Arc.
*Blitum capitatum*. Subarc.
Listera convallarioides. Subarc.
Carex muricata.
Eatonia obtusata.
Festuca ovina. Alp.* Arc. Mex.

FLORA OF THE WAHSATCH AND UINTAS, AND OF THE WASHOE MOUNTAINS. The collection made in the Wahsatch and Uinta Mountains showed, as was to be expected, a much more extensive flora here than in the mountains of the Basin, adding 224 species, 47 genera and 6 orders to those previously collected. The total found was 618, against 393 in the western ranges, a very large majority of these latter being again gathered in the mountains of Utah.

The steep slopes of the Wahsatch which face the western valley are bare of trees and dry, only partially covered toward the base with scattered thickets of a low form of *Quercus alba*. In the cañons, however, which lead up many miles into the recesses of the range, there is usually, where not too rocky and precipitous, a free growth of most of the shrubs and plants already mentioned as common westward, with others which have either been very rare or wanting altogether. Among these are *Cowania* and *Celtis*, *Cercocarpus parvifolius*, *Acer glabrum*, *Spiræa opulifolia*, *Rosa fraxinifolia*, *Pachystima*, and near the stream-banks *Rhus aromatica* and *glabra*, *Acer grandidentatum*, *Negundo*, *Sambucus racemosa*, *Betula occidentalis*, and in the very high

cañons of the Uintas *B. glandulosa* and *Vaccinium Myrtillus.* The timber trees, which are found from the middle cañons to an altitude of about 10,000 feet, consist of *Pinus flexilis* and *ponderosa*, and the smaller *contorta*, with *Abies Menziesii*, *Engelmanni* and *Douglasii*, *grandis* and *amabilis.* *Juniperus occidentalis* is replaced by *J. Virginiana.* In some of the cañons the cottonwood attains a large size, but the oak, which is frequent through the Wahsatch, and maple are rarely large enough to become of value. The valleys of Bear River and the Weber have a flora resembling that of the higher valleys of the Basin, with *Artemisia*, &c., but in the still higher parks the vegetation is principally herbaceous and very various.

As shown by the subdivisions of the following list of the plants collected only in these mountains, thirty-two species are either new or not yet found elsewhere; twelve occur in the Pacific ranges, seventy in the Rocky Mountain region, and forty-two others in both mountain systems, only twenty of the whole extending eastward towards the Saskatchewan or Mississippi. Of these western species seventeen are arctic and twelve subarctic, to twenty-eight alpine and twenty-two subalpine. In division (*c.*) are forty-two species which are found on both the Pacific and Atlantic slopes, and twenty-six belonging to the Atlantic side only; of these twenty-six are arctic and fifteen subarctic, to six alpine and seven subalpine. If, however, the entire collection from these mountains be taken into account, division (*a.*) will include 57 species, the three sections of division (*b.*) 61, 120 and 194 species respectively, and the sections of division (*c.*) 151 and 35 species. While the proportion of arctic and subarctic plants remains the same (but with a disproportionate increase among the more widely diffused species,) that of Mexico and southern species becomes one-half greater. The whole number of alpine species will be seventy-nine and of subalpine sixty-eight.

*Species collected only in the Wahsatch and Uintas.*

(*a.*)

Parrya macrocarpa. Alp. Arc.
**Caulanthus hastatus.**
Lychnis Ajanensis ? Alp. Sib.
Sagina nivalis ? Alp. Gr.
Lewisia brachycalyx. S.
Linum Kingii. Subalp.*
Lupinus parviflorus.
**Trifolium Kingii.**
**Andinum.**
**gymnocarpon.**
**Astragalus jejunus. Val.**
Orogenia linearifolia.
Cymopterus longipes.
**Angelica pinnata.**
Peucedanum simplex. S.
bicolor.
Lonicera Utahensis.
Aster Kingii.
Erigeron ursinum. Subalp.
**stenophyllum. Subalp.**
**Tanacetum diversifolium.**
Taraxacum phymatocarpum. Alp. Gr.
Synthyris pinnatifida.
Castilleia flava. Val.
Gilia stenothyrsa.
**tenerrima. Val.**
Gentiana heterosepala.
Polygonum minimum. Alp.
Allium brevistylum.
Carex elongata. Subalp. Subarc.
vulgaris, var. Subalp.*
**Poa Eatoni.**

(*b.*)

Saxifraga integrifolia.
Zauschneria Californica. Mex.

Osmorhiza nuda. Subarc.
Arctostaphylos glauca. S.
Pentstemon centranthifolius. S.
heterophyllus.
Nemophila parviflora. S.
Salix phlebophylla. Alp. Arc.
Brodiæa multiflora.
Carex Hoodii.
laciniata.
Danthonia Californica.

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Clematis Douglasii.
alpina, var. Subalp.
Thalictrum sparsiflorum. Subarc. E.
Ranunculus affinis, var. Subalp.* Arc.
orthorhynchus, var. Subalp.
Aquilegia flavescens.
Draba aurea. Subalp.
Arenaria congesta. Subalp.*
verna. Alp. Arc. Lab.
Claytonia arctica, var. Alp. Arc.
Sidalcea candida.
Acer grandidentatum.
Trifolium nanum. Alp.
dasyphyllum. Alp.
Parryi.
Astragalus campestris.
simplicifolius. Subalp.
Hedysarum Mackenzii. Arc. E.
Lathyrus ornatus. E.
Rubus leucodermis.
Cercocarpus breviflorus.
Potentilla nivea. Alp. Arc. Lab.
Saxifraga flagellaris. Alp. Arc.
cæspitosa. Alp. Arc. Lab.
rivularis. Alp. Arc. Lab.
Mitella trifida.
Jamesia Americana.
Ribes viscosissimum.
Sedum rhodanthum.
Œnothera breviflora.
coronopifolia. Val. S. E.
Aster glaucus.
Erigeron grandiflorum.
macranthum. E.
ochroleucum.
Aplopappus Parryi.
uniflorus. Val. E.
Nuttallii. Val. E.
Helianthella uniflora. S.
Artemisia filifolia. S. E.
scopulorum. Alp.
Senecio eremophilus. Subarc. E.
Fremontii. Alp.*
Cirsium eriocephalum. Alp.*
Campanula uniflora. Alp. Arc.
Vaccinium Myrtillus. Subarc.
Pentstemon cyananthus.
cæspitosus. Val.
glaucus. Subalp.*
Pedicularis bracteosa. E.
Lithospermum longiflorum. Mex. E.
Mertensia brevistyla.
Eritrichium villosum, var. Alp.
Gilia Gunnisoni.
Gilia minima.
Gentiana frigida, var. Alp.
Paronychia pulvinata. Alp.
Eriogonum corymbosum.
brevicaule.
racemosum. Val.
Rumex paucifolius.
Euphorbia montana. Mex.
Salix arctica. Alp. Arc. Lab.
Calochortus Gunnisoni.
Allium reticulatum. Val. E.
Carex Pyrenaica. Alp. Subarc. E.
limula. Subalp.
saxatilis, var. Subalp. Gr.
concinna. Subalp. Arc.
Poa cæsia. Alp. Arc. E.

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Aquilegia cærulea.
Viola palustris. Lab. White Mts.
Lychnis Drummondi. S. E.
Arenaria formosa. Arc. S.
Sagina Linnæi. Arc.
Ptelea angustifolia. S.
Lupinus leucophyllus. Val.
aridus. Val.
Lathyrus polyphyllus.
Ivesia Gordoni. Alp.*
Rosa fraxinifolia.
Ligusticum apiifolium.
Archangelica Gmelini. Alp. Arc. Mass.
Erigeron acre. Subalp.* E.
Balsamorrhiza macrophylla.
Amida hirsuta. E. S.
Arnica latifolia. Subalp. Subarc.
Senecio filifolius. Val. E.
Hieracium albiflorum.
triste. Subalp.* Subarc.
Gaultheria Myrsinites. Subarc.
Pedicularis racemosa. Subalp.*
Verbena bracteoca. E.
Betula occidentalis.
Pinus contorta, var. Subarc.
Abies Menziesii. Subarc.
amabilis.
Douglasii. S.
Habenaria fœtida.
Zigadenus Fremontii. Val.
Prosartes trachycarpa.
Erythronium grandiflorum.
Milla grandiflora.
Juncus Drummondii. Subalp. Subarc.
Carex nigricans. Alp. Subarc.
Bonplandii, var. Subalp.
lagopina. Subalp. Gr.
Haydeniana.
Raynoldsii. Alp. E.
Geyeri.
Glyceria pauciflora.
Catabrosa aquatica. Gr. E.

(*c*.)

Clematis verticillaris.
Ranunculus Flammula, var. Arc.
Nuphar advena. Subalp. Subarc.
Viola Canadensis.
Cerastium arvense.
Stellaria borealis. Arc.
Negundo aceroides.
Rhus glabra.
Rhus Toxicodendron.
Lathyrus palustris. Mex.
Fragaria vesca. Arc.
Virginiana, var.
Potentilla Norvegica. Subarc.
Ribes prostratum. Subarc.
Circæa alpina, var. Subarc.
Linnæa borealis. Arc.
Sambucus racemosa, var. Subarc.
Galium trifidum. Arc.
Antennaria margaritacea. Subarc.
Campanula rotundifolia. Alp.* Arc.
Specularia perfoliata.
*Vaccinium myrtilloides.* Subarc.
Pyrola chlorantha. Arc.
secunda. Arc.
Moneses uniflora. Subarc.
Chimaphila umbellata. Mex.
Pterospora Andromedea.
Lysimachia ciliata. Val.
Aphyllon uniflorum.
Veronica serpyllifolia. Subalp. Subarc. Mex.
Lycopus sinuatus.
Scutellaria galericulata. Subarc.
*Betula glandulosa.* Subalp.* Arc.
Zannichellia palustris. Mex.
Corallorhiza multiflora.
Streptopus amplexifolius. Subarc.
Luzula campestris. Arc.
*Juncus filiformis.* Arc.
Carex straminea. Alp. Arc. Mex.
Buxbaumii. Subalp. Arc.
Poa serotina. Arc.
Hierochloa borealis. Arc.

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Ranunculus multifidus. Val. Arc.
Trollius laxus. Subalp.
*Lychnis apetala.* Alp. Arc.
Cerastium vulgatum, var. Alp. Arc.
Arenaria lateriflora. Subarc.
Flœrkia proserpinacoides.
*Dryas octopetala.* Alp. Arc.
*Callitriche autumnalis.* Arc.
Thaspium trifoliatum.
*Taraxacum palustre.* Alp. Arc.
*Vaccinium uliginosum.* Arc.
*Dracocephalum parviflorum.* S. Subarc.
Physalis pubescens.
Polygonum lapathifolium, var.
*Eleagnus argentea.* Val. Subarc.
Humulus Lupulus.
Quercus alba, var.
Sparganium minimum. Subalp.* Arc.
Potamogeton rufescens. Arc.
pusillus, var.
Tradescantia Virginica.
Carex tenella. Arc.
vitilis. Arc.
Magellanica. Subalp.
capillaris. Subarc.
Poa flexuosa. ?

There was little opportunity for investigating the flora of that portion of the Sierras which lies in Western Nevada, but sufficient was seen to show that it differs widely from that of the mountain ranges of the Basin. The heavily timbered mountain sides, the well-watered cañons, the picturesque shores of Lake Tahoe and the snowy crown of Washoe Peak yet remain a rich and inviting field for the botanical collector. The species of the following list are mostly of Dr. C. L. Anderson's collection from "near Carson City," and are referred to these mountains as their probable habitat. All are confined to California or Oregon, excepting *Pentstemon Menziesii*, which extends to the Rocky Mountains of British America. *Fragaria vesca* and *Arctostaphylos glauca* should be added, also found in the Uintas but not in the intervening territory.

*Species collected in the Washoe Mountains.*

Ceanothus divaricatus, var. prostratus.
Lupinus calcaratus.
Andersoni.
Torreyi.
Breweri.
Trifolium Andersonii.
Prunus emarginata.
Horkelia parviflora.
Ribes sanguineum, var.
Lonicera conjugialis.
Aster Andersonii.
Artemisia potentilloides.
Pentstemon Menziesii. R.
breviflorus.
gracilentus.
Cordylanthus tenuis.
Polemonium micranthum.
Solanum umbelliferum.
Castanopsis chrysophylla.
Libocedrus decurrens.
Lilium parvum.
Milla hyacinthina.
Juncus chlorocephalus.

Southern Flora of Nevada and Utah. The region lying south of that embraced in the survey becomes gradually more dry and desert and the vegetation approaches more and more to that of Arizona and southeastern California. Little, however, is actually known of the flora, and no more promising field lies open to the botanist than this. The collections that have been made by Dr. Edward Palmer in Southern Utah and the few other species that could be found reported as growing within the limits of Nevada and Utah are embraced in the Catalogue and given without attempt at classification in the following list. Some, like the *Larrea*, are widely diffused and abundant desert species; others are rare and confined to the mountains. The *Anemopsis* appears to be the only saline aquatic among them.

*Species reported from Southern Nevada and Utah.*

Berberis Fremontii.
Krameria parvifolia.
Sphæralcea incana, var.
Larrea Mexicana.
Thamnosma montana. Mex.
Ceanothus Greggii. Mex.
Trifolium subcaulescens.
Hosackia argophylla.
puberula. Mex.
Dalea lanata.
Fremontii.
Johnsoni.
Astragalus Preussii.
Robinia Neo-Mexicana.
Prosopis pubescens.
Prunus minutiflora.
Petalonyx Thurberi. Mex.
Mentzelia multiflora.
Mamillaria Grahami.
phellosperma.
vivipara, var.
Echinocactus polyancistrus.
Johnsoni.
polycephalus.
Opuntia basilaris.
Garrya ——— ?
Brickellia atractyloides.

Palafoxia linearis.
Aplopappus sphærocephalus.
spinulosus, var. Mex.
Tessaria borealis.
Franseria dumosa.
Simsia canescens.
Tithonia argophylla.
Gaillardia pinnatifida. Mex.
Hymenopappus luteus.
Baileya pleniradiata. Mex.
Arctostaphylos pungens. ?
Salazaria Mexicana. Mex.
Coldenia hispidissima.
Phacelia Palmeri.
rotundifolia.
Fremontii.
Gilia setosissima.
Schottii.
Lycium pallidum.
Datura Meteloides. Mex.
Frasera albomarginata.
Fraxinus anomala.
viridis.
Abronia umbellata.
Obione hymenelytra.
Alternanthera lanuginosa. Mex.
Eriogonum fasciculatum.
trichopodum.
Anemopsis Californica. Mex.
Euphorbia polygonifolia.
Croton procumbens. Mex.
Yucca baccata.
brevifolia.
angustifolia.
Agave Utahensis.

INTRODUCED PLANTS. The following list includes all the plants of the collection that could be considered as introduced. The first eight seemed to make themselves perfectly at home among the sage-brush, but there are forms of *Chenopodium album* which are undoubtedly indigenous. The rest were found only near old fields or fences or in actual cultivation, excepting the last four, which were collected on stream-banks in cañons near roads traveled only by the teams of woodmen. Their introduction is perhaps questionable.

*Introduced Species.*

Brassica nigra.
campestris.
Capsella Bursa-pastoris.
Saponaria Vaccaria.
Maruta Cotula.
Marrubium vulgare.
Chenopodium album.
Botrys.

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Nasturtium officinale.
Portulaca oleracea.
Medicago sativa.
Melilotus alba.
parviflora.
Peucedanum sativum.
Coriandrum sativum.
Verbascum Thapsus.
Satureia hortensis.
Nepeta Cataria.
Verbena hastata.
Solanum nigrum.
Datura Stramonium.
Amarantus paniculatus.
Polygonum Persicaria.
Polygonum Convolvulus.
Phleum pratense.
Eragrostis poæoides.
Hordeum Himalayense.
Avena fatua.
sativa.

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Taraxacum Dens-leonis.
Polypogon Monspeliensis.
Poa annua.
Setaria viridis.

RÉSUMÉ OF THE DISTRIBUTION AND RANGE OF GENERA AND SPECIES. The plants of the collection have been grouped in the preceeding lists according to the localities in which they were actually found. The few other reported species also included are placed, when the character of the habitat was not actually known, where they would be most likely to fall. As regards the range of the species, by which the lists are subdivided, no more than approximate correctness is in many cases possible. In the Catalogue the range of each species within the United States and British America is given as accurately as it could be learned by reference to published works and an examination of the collections at hand. But the recorded localities, of the older collectors especially, are frequently more or less indefinite, many species are little known or have been collected only from widely separated localities, and hence an arrangement that should propose to give more than a very

general outlining of the range is out of the question. However, it is rather as an experiment that any discussion of the matter has been attempted, with the hope of arriving not at any positive conclusions but possibly at indications of the results that may be looked for from a more thorough and extended consideration of fuller and more reliable data.

The total number of indigenous phænogamous species enumerated in the Catalogue as growing in Nevada or Utah is 1235, representing 439 genera and 84 orders. Of these, 3 orders, 14 genera and 62 species have been found only in the more southern portion of the territory, and 6 orders, 49 genera, and 248 species only in the Washoe, Wahsatch, or Uinta Mountains, leaving 75 orders, 376 genera and 945 species for the known flora of this portion of the Basin proper.

The alkaline group, comprising 19 orders, 37 genera, and 49 species, is predominantly Chenopodiaceous and Gramineous, the first named order giving one-fourth of both genera and species, and with the *Gramineæ*, *Compositæ*, and *Cruciferæ*, including more than half of each. It is also decidedly western and is more strictly confined to the Basin than any other group, only two-fifths of the species occurring upon the Pacific slope and one-fourth upon the Atlantic. This is noteworthy in connection with the fact that large areas of the Basin were at a comparatively recent geological period occupied by fresh-water lakes. More of the species tend southward than beyond the British boundary.

The aquatic and meadow group embraces 170 species, representing 100 genera and 42 orders. The only very prominent orders are the *Compositæ*, *Gramineæ*, and *Cyperaceæ*, which include one-third of the genera and two-fifths of the species. The *Scrophulariaceæ*, *Leguminosæ*, and *Rosaceæ* make up more than half of the species and 45 per cent. of the genera. The species are very widely diffused in all directions, more than one-third being arctic or subarctic, three-fifths reaching the Atlantic and four-fifths the Pacific side of the continent, while one-fourth are decidedly southern.[1] Half of the composite species are asteroid, the remaining species and two-thirds of the genera being equally senecioid and ligulate.

The next group of plants, representing the desert flora, includes 38

[1] By an oversight a number of species, well known as extending into Mexico, failed to be so noted in the list. Such in division (*c.*) are the species of *Cardamine*, *Potentilla*, *Gentiana*, *Ceratophyllum*, *Sisyrinchium*, *Eleocharis*. *Phragmites*, *Triticum*. *Ranunculus aquatilis*, *Juncus Balticus* and *bufonius*, and *Scirpus validus*. *Carex disticha* should also be inserted before *C. stipata*.

orders, 134 genera and 305 species. By far the largest order is the *Compositæ*, to which belong 28 per cent. of the genera and one-fifth of the species, somewhat more than half, both of genera and species, being senecioid and one-fourth ligulate. The *Cruciferæ*, *Gramineæ*, and *Scrophulariaceæ* follow in the number of their genera, making more than half of the whole, but the numerous *Astragali* and *Eriogoneæ* place the *Leguminosæ* and *Polygonaceæ* in advance in respect of species, which orders with the *Cruciferæ* and *Scrophulariaceæ* form one-half. The *Polemoniaceæ*, *Hydrophyllaceæ*, *Onagraceæ*, *Chenopodiaceæ* and *Borraginaceæ* are also large orders with from three to six per cent. of species. This group is decidedly western and southern, less than five per cent. appearing on the Atlantic slope, while 55 per cent. are on the Pacific side and nearly one-third extend to Arizona or beyond.

In the mountain flora of the Basin there are 51 orders, 191 genera and 393 species. The composites, though less predominent than in the last group, have yet more than 18 per cent. of the species and over 17 per cent. of the genera, half of which genera and nearly half the species are senecioid, 27 per cent. of the genera and 35 per cent. of the species being asteroid. The proportion of the other orders has changed largely, the relative increase being greatest in the *Rosaceæ*, *Caryophyllaceæ*, and *Saxifragaceæ*, and somewhat less in the *Liliaceæ*, *Ericaceæ*, *Coniferæ*, and *Umbelliferæ*, with but little increase or even a diminution of numbers in the other more prominent orders. Seven orders have now to be joined with the *Compositæ* to form half of the genera and species, viz: *Leguminosæ*, *Cruciferæ*, *Rosaceæ*, *Gramineæ*, *Scrophulariaceæ*, *Polemoniaceæ* and *Ranunculaceæ*—the last equaled in species by the *Caryophyllaceæ*, *Saxifragaceæ* and *Polygonaceæ*.

The tendency of the range is, as was to be expected, toward the north and northwest. The number of Pacific species is nearly 70 per cent., to 22 per cent. upon the Atlantic side; only 9 per cent. are known as southern, but nearly 30 per cent. are arctic or subarctic, and as large a proportion alpine or subalpine.

If the species found in the Wahsatch and Uintas be included the results are somewhat changed; the proportion of *Compositæ* is reduced to one-sixth of the species and one-seventh of the genera, and the *Leguminosæ* are followed in number of species by the *Cyperaceæ*, *Rosaceæ*, *Gramineæ*, *Caryophyllaceæ*, *Ranunculaceæ* and *Scrophulariaceæ*. The proportion of

Atlantic species increases to one-fourth and that of the Pacific diminishes to three-fifths.

Looking at the Basin flora as a whole it appears to a considerable degree a distinct one. Though the position of the territory would rather indicate as probable an intermingling of the surrounding floras, of the Californian with that of the Rocky Mountains, and of the extreme northern, descending along the mountain ranges, with that of the deserts of Arizona spreading northward in the valleys—as indeed is largely the case—yet it has a marked character of its own. This consists partly in the absence of many of the peculiarities of the surrounding floras. A very large portion of Pacific species, not only arborescent but shrubby and herbaceous, stop abruptly upon the eastern slope of the Sierras and do not reappear eastward. For this reason the California district should be considered as limited on the east by that range, the whole southeastern portion of the State and a smaller section in the northeastern part belonging geographically and botanically to the Colorado Desert and to the Basin respectively. A like line of demarcation is shown on the eastern side at the base of the Wahsatch by the immediate accession of new orders and species characteristic of the eastern flora. Again many of the forms prevalent farther south are wanting or appear only on the borders of Nevada and Utah, as most of the *Cactaceæ* and of the *Daleas* and other large leguminous genera and even suborders, characteristic Rutaceous and Zygophyllaceous species, the *Cucurbitaceæ* and *Loranthaceæ*, *Salvia*, and the larger portion of the *Solanaceæ*, *Euphorbiaceæ* and *Nyctaginaceæ*. The mingling with northern species is necessarily more intimate, yet with a more exact knowledge of the habitats of "Oregon" species a well marked limit of the Basin flora could probably also be drawn in that direction. But aside from these deficiencies, the general preponderence of senecioid composites, of which the *Artemisia tridentata* may be considered the prevailing representative, and the so marked number of chenopodiaceous genera and species, many of which do not extend greatly beyond the limits of the Basin, make the flora a singular one and warrant designating the district as one of Artemisias and Chenopods. The abundance of species of *Astragalus*, *Eriogonum* and the allied genera, *Œnothera*, *Pentstemon*, and *Phacelia*, is also in a more or less degree distinctive.

The following table shows the distribution of the genera and species arranged by orders:

| Orders. | Total Genera. | Total Species. | Basin. Genera. | Basin. Species. | Not found in the Basin. Wahsatch and Uintas. Genera. | Wahsatch and Uintas. Species. | Sierras. Genera. | Sierras. Species. | Southern. Genera. | Southern. Species. | Basin Species. Alkaline. | Aquatic. | Dry Valley. | Mountain. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranunculaceæ | 12 | 37 | 11 | 26 | 1 | 11 | | | | | 1 | 4 | 6 | [illegible] |
| Berberideæ | 1 | 2 | 1 | 1 | | | | | | 1 | | | | 1 |
| Nymphæaceæ | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Papaveraceæ | 3 | 3 | 3 | 3 | | | | | | | | | [illegible] | 1 |
| Cruciferæ | 21 | 55 | 20 | 51 | 1 | 3 | | | | | 4 | 5 | [illegible] | [illegible] |
| Capparideæ | 3 | 7 | 3 | 7 | | | | | | | 3 | | 1 | |
| Violaceæ | 1 | 6 | 1 | 4 | | 2 | | | | | | 1 | | [illegible] |
| Polygalaceæ | 1 | 1 | | | | | | | 1 | 1 | | | | |
| Caryophyllaceæ | 7 | 28 | 4 | 15 | 3 | 13 | | | | | | | | 15 |
| Portulacaceæ | 5 | 11 | 5 | 9 | | 2 | | | | | | | 1 | [illegible] |
| Elatineæ | 2 | 2 | 2 | 2 | | | | | | | | 2 | | |
| Hypericaceæ | 1 | 2 | 1 | 2 | | | | | | | | | | 2 |
| Malvaceæ | 4 | 8 | 4 | 6 | | 1 | | | | 1 | | 1 | 4 | 1 |
| Linaceæ | 1 | 2 | 1 | 1 | | 1 | | | | | | | | 1 |
| Zygophyllaceæ | 1 | 1 | | | | | | | 1 | 1 | | | | |
| Geraniaceæ | 3 | 4 | 2 | 3 | 1 | 1 | | | | | | | 1 | [illegible] |
| Rutaceæ | 2 | 2 | | | 1 | 1 | | | 1 | 1 | | | | |
| Celastrineæ | 1 | 1 | 1 | 1 | | | | | | | | | | 1 |
| Rhamneæ | 1 | 5 | 1 | 2 | | | | 2 | | 1 | | | | [illegible] |
| Sapindaceæ | 2 | 3 | 1 | 1 | 1 | 2 | | | | | | | | [illegible] |
| Anacardiaceæ | 1 | 3 | 1 | 1 | | 2 | | | | | | | 1 | |
| Leguminosæ | 14 | 90 | 10 | [illegible] | 2 | 16 | | 3 | 2 | [illegible] | 1 | [illegible] | [illegible] | [illegible] |
| Rosaceæ | 16 | 43 | 15 | 31 | 1 | 6 | | 2 | | 1 | 1 | 6 | 2 | 22 |
| Saxifrageæ | 7 | 27 | 6 | [illegible] | 1 | 5 | | 1 | | | | 2 | 1 | [illegible] |
| Crassulaceæ | 2 | 5 | 2 | 4 | | 1 | | | | | | 1 | | [illegible] |
| Halorageæ | 3 | 4 | 3 | 3 | | 1 | | | | | | 3 | | |
| Lythraceæ | 1 | 1 | 1 | 1 | | | | | | | | 1 | | |
| Onagraceæ | 7 | 29 | 5 | 25 | 2 | 4 | | | | | | 3 | 12 | 10 |
| Loasaceæ | 2 | 5 | 1 | 3 | | | | | 1 | 2 | | | [illegible] | |
| Cactaceæ | 4 | 16 | 4 | 10 | | | | | | 6 | | | 8 | [illegible] |
| Ficoideæ | 1 | 1 | 1 | 1 | | | | | | | 1 | | | |
| Umbelliferæ | 16 | 31 | 11 | 22 | 5 | 9 | | | | | | 4 | [illegible] | [illegible] |
| Cornaceæ | 2 | 2 | 1 | 1 | | | | | 1 | 1 | | | | 1 |
| Caprifoliaceæ | 4 | 7 | 3 | 3 | 1 | 3 | | 1 | | | | | | 3 |
| Rubiaceæ | 1 | 8 | 1 | 7 | | 1 | | | | | | 1 | 1 | 5 |
| Valerianaceæ | 2 | 3 | 2 | 3 | | | | | | | | 1 | 1 | 1 |
| Compositæ | 69 | 207 | 62 | 167 | 1 | 27 | | 2 | 7 | 11 | 4 | [illegible] | [illegible] | 72 |
| Eupatoriaceæ | 3 | 3 | 2 | [illegible] | | | | | 1 | 2 | | | [illegible] | [illegible] |
| Asteroideæ | 13 | 68 | 12 | [illegible] | | 11 | | 1 | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Senecionideæ | 39 | [illegible] | 34 | 75 | | 14 | | 1 | 5 | [illegible] | | 7 | [illegible] | [illegible] |
| Cynareæ | 1 | 5 | 1 | 4 | | [illegible] | | | | | | 1 | | [illegible] |
| Liguliflora | 13 | [illegible] | 13 | [illegible] | | 4 | | | | | 1 | [illegible] | 17 | [illegible] |
| Lobeliaceæ | 1 | 1 | 1 | 1 | | | | | | | | 1 | | |
| Campanulaceæ | 3 | 4 | 1 | 1 | 1 | 3 | | | | | | | | 1 |
| Ericaceæ | 9 | [illegible] | 5 | [illegible] | 4 | [illegible] | | | | 1 | | 1 | | [illegible] |
| Plantagineæ | 1 | 3 | 1 | 3 | | | | | | | | 3 | [illegible] | |
| Primulaceæ | 6 | 7 | 5 | [illegible] | 1 | 1 | | | | | | [illegible] | 1 | [illegible] |
| Lentibulariaceæ | 1 | [illegible] | 1 | [illegible] | | | | | | | | [illegible] | | |
| Orobanchaceæ | 2 | 3 | 1 | [illegible] | | 1 | | | | | | | [illegible] | |
| Scrophulariaceæ | 14 | [illegible] | 13 | [illegible] | 1 | 16 | | 4 | | | | 7 | [illegible] | [illegible] |
| Verbenaceæ | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Labiatæ | 11 | [illegible] | 10 | [illegible] | 2 | 3 | | | 1 | 1 | | 2 | [illegible] | [illegible] |
| Borraginaceæ | [illegible] | [illegible] | [illegible] | [illegible] | | 3 | | | | [illegible] | 1 | | [illegible] | [illegible] |
| Hydrophyllaceæ | 7 | [illegible] | 6 | [illegible] | 1 | 1 | | | | [illegible] | | | 17 | [illegible] |
| Polemoniaceæ | 4 | 41 | 4 | [illegible] | | 4 | | 1 | | [illegible] | | | 13 | 16 |

| Orders. | Total Genera. | Total Species. | Basin. | | Not found in the Basin. | | | | Southern. | | Basin Species. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wahsatch and Uintas. | | Sierras. | | | | | | | |
| | | | Genera. | Species. | Genera. | Species. | Genera. | Species. | Genera. | Species. | Alkaline. | Aquatic. | Dry Valley. | Mountain. |
| Convolvulaceæ | 3 | 4 | 3 | 4 | | | | | | | 1 | | 2 | 1 |
| Solanaceæ | 6 | 8 | 4 | 4 | 1 | 1 | | 1 | 1 | 2 | 1 | | 3 | |
| Gentianaceæ | 6 | 12 | 6 | 9 | | 2 | | | | 1 | 1 | 5 | | 3 |
| Apocynaceæ | 1 | 2 | 1 | 2 | | | | | | | | 1 | | 1 |
| Asclepiadaceæ | 2 | 4 | 2 | 4 | | | | | | | | 1 | 2 | 1 |
| Oleineæ | 1 | 2 | | | | | | | 1 | 2 | | | | |
| Nyctaginaceæ | 4 | 7 | 4 | 6 | | | | | | 1 | | | 6 | |
| Chenopodiaceæ | 13 | 26 | 13 | 25 | | | | | | 1 | 14 | | 10 | 1 |
| Amarantaceæ | 4 | 5 | 3 | 4 | | | | | 1 | 1 | 1 | | 3 | |
| Paronychiaceæ | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Polygonaceæ | 6 | 50 | 6 | 42 | | 6 | | | | 2 | | 5 | 22 | 15 |
| Eleagnaceæ | 2 | 3 | 1 | 2 | 1 | 1 | | | | | | 1 | | 1 |
| Santalaceæ | 1 | 1 | 1 | 1 | | | | | | | | | | 1 |
| Saururaceæ | 1 | 1 | | | | | | | 1 | 1 | | | | |
| Ceratophyllaceæ | 1 | 1 | 1 | 1 | | | | | | | | 1 | | |
| Euphorbiaceæ | 2 | 7 | 1 | 4 | | 1 | | | 1 | 2 | 1 | | 3 | |
| Urticaceæ | 4 | 4 | 3 | 3 | 1 | 1 | | | | | | 2 | 1 | |
| Cupuliferæ | 2 | 2 | | | 1 | 1 | 1 | 1 | | | | | | |
| Betulaceæ | 2 | 3 | 1 | 1 | 1 | 2 | | | | | | | | 1 |
| Salicaceæ | 2 | 12 | 2 | 8 | | 2 | | 2 | | | | 4 | | 4 |
| Gnetaceæ | 1 | 1 | 1 | 1 | | | | | | | | | 1 | |
| Coniferæ | 4 | 14 | 3 | 9 | | 4 | 1 | 1 | | | | | | 9 |
| Lemnaceæ | 1 | 4 | 1 | 4 | | | | | | | | 4 | | |
| Typhaceæ | 2 | 3 | 2 | 2 | | 1 | | | | | | 2 | | |
| Naiadaceæ | 2 | 9 | 1 | 6 | 1 | 3 | | | | | | 6 | | |
| Alismaceæ | 3 | 4 | 3 | 4 | | | | | | | 2 | 2 | | |
| Orchidaceæ | 5 | 7 | 4 | 5 | 1 | 2 | | | | | | 1 | | 4 |
| Iridaceæ | 2 | 3 | 2 | 3 | | | | | | | | 2 | | 1 |
| Liliaceæ | 18 | 37 | 16 | 21 | 4 | 9 | | 2 | 2 | 4 | 1 | 2 | 7 | 11 |
| Juncaceæ | 2 | 14 | 2 | 10 | | 3 | | 1 | | | | 5 | | 5 |
| Pontederiaceæ | 1 | 1 | 1 | 1 | | | | | | | | 1 | | |
| Commelynaceæ | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Cyperaceæ | 5 | 55 | 5 | 33 | | 20 | | | | | 2 | 19 | | 12 |
| Gramineæ | 35 | 68 | 33 | 59 | 2 | 8 | | | | 1 | 7 | 20 | 13 | 19 |

Of the 1141 species given in the lists of the Basin, Wahsatch and Uintas, 687 or 60 per cent. appear to be found upon the Pacific slope, 678 or nearly the same proportion do not pass eastward beyond the Rocky Mountains, 177 or 15 per cent. approach or reach the Mississippi or Saskatchewan, and 287 or 25 per cent. approach the Atlantic; 17 per cent. are Mexican or southern, very nearly 15 per cent. are arctic, and over 8 per cent. more extend north of latitude 55°.

Of these 170 arctic and 95 subarctic species 30 per cent. in each class are found among the plants of the valleys and foot-hills, and of these again 80 per cent. are among those species which have the widest range in longitude. In the mountains of the Basin 45 per cent. are found, of which 60 per

cent. belong to the plants of widest range. The flora of the Wahsatch and Uintas contains 75 per cent. of the arctic and 81 per cent. of the subarctic species; 63 per cent. of the first and one-half of the last are also upon the Atlantic side of the continent.

Among the 101 alpine and 77 subalpine species there is a comparatively small proportion of the arctic or higher northern plants. But 46 arctic species were collected in alpine localities and but 19 others could even be considered as subalpine, while but 20 of the subarctic species were either alpine or approaching it.

In regard to the range of the genera but little can be said. Of the 439 genera of the Catalogue 148, including 288 species, are not found in the United States east of the Mississippi. Of the remaining genera, which are thus found, 109 have their 146 species also all eastern, 96 with 297 species include among them none that occur east of the Mississippi, and 86 are divided in this respect, including 182 eastern and 323 western species.

No attempt has been made at giving the range of species beyond the limits of North America. Mr. Olney states that of the forty-five species of *Carex*, named in the Catalogue, fourteen are found in both Europe and Asia, five in Europe only, two in Asia only, and two in South America, of which one also occurs in Europe and Asia. Two of these European species are for the first time identified as American in this collection. The range of the mosses only is given as fully as it could be ascertained.

Cryptogamic Flora. The atmospheric conditions are incompatible with even an ordinary development of cryptogamic vegetation in the Basin. Ferns are rare, occasionally found in the higher mountains but in many of the ranges wholly absent. In the Wahsatch and Uintas they are more frequent and in a larger number of species. Only twelve species were collected, five of which were confined to Utah. Nine of these range from the Atlantic or from the Great Lakes to the Pacific, of which three are arctic and two subarctic.

No opportunity for the collection of mosses was neglected and the material has been most patiently and thoroughly elaborated by Mr. James, who returns an unexpected number of species. Some of them, like the *Grimmia*, were attached to the driest sun-burned rocks of the valleys, others were found only in early spring under sage-brush and in the meadows near Carson City. Far the larger number were collected on the wet banks of

perennial streams, especially in the East and West Humboldt Mountains or more frequently in the Wahsatch and Uintas, and in the cold springs of Ruby Valley. Of the 97 species 82 are common to Europe, 32 have been found in Arctic America or Greenland, and four are subarctic. Forty-three extend from the Atlantic to the Pacific and sixteen others occur in the Eastern States. Of the 15 species not European 8 are considered new, 2 are found in California, 2 in the Rocky Mountains, 2 both in the Rocky Mountains and westward, and one from the Atlantic to the Pacific. Three of the European species had not been before identified as American.

The few *Hepaticæ* collected were found only in the higher mountains, mostly in the Wahsatch and Uintas. Lichens are sometimes abundant in the the lower ranges of the Basin, but confined to a few well known genera and species. The *Lecanoræ* are most conspicuous, covering large surfaces of the rocks and clifts with their bright colors. In other mountains all kinds are rare. *Fungi* were very seldom met with in any part of the territory.

AGRICULTURAL RESOURCES. It is evident from what has already been said that the agricultural resources of the Basin are not great. The actual limit is fixed by the deficiency of water. With a moderate supply for irrigation during the growing season there is no difficulty in securing good crops of cereals and vegetables in any of the valleys and lower cañons of the territory. The most fertile localities lie at the base of the Sierras, but as a rule there is an apparent absence everywhere of a true soil or mould resulting from the decomposition of vegetable matter. It is well known, however, that the *Artemisia tridentata* is always evidence of a considerable degree of fertility, and as also the presence of a moderate amount of alkalies is by no means detrimental it follows that a very large extent of surface must be adapted to agricultural purposes. But with the present actually available supply of water from the rivers and mountain streams, even were the whole of it employed in the most economical manner, it is estimated that out of the 34,000 square miles in Northern Nevada within the limits of the maps of the survey not over 1,000 square miles could ever be brought under cultivation. The relative amount in Western Utah and in the more southern portions of the Basin must be less. The labor and expense of making canals and ditches, the limited markets for produce, and the competion in those markets of the overflow of California's abundance will probably long prevent more than a very partial development of the real capabilities of the region.

The larger and more constant supply of water from the Wahsatch and Uintas renders possible a much more general improvement of the resources of Utah. The lands at the western base of the Wahsatch, large portions of the valleys of the Bear, Weber, and Provo Rivers, and such of the parks as are not too elevated may all be brought under cultivation. Yet the actual cost of bringing water upon these lands, fencing them and putting them in a producing condition, at the ordinary rates of wages, is said to be nearly fifty dollars an acre.

For grazing purposes the region is not generally adapted, as is proven by the absence of all graminivorous animals excepting rabbits in the valleys and rarely a few mountain sheep or antelopes in the higher ranges. In the spring and early summer there is a considerable supply of nourishing grass in many localities, but it is not continuous, and for several months forage is very scanty except as scattered through the mountain cañons. A substitute for grass is sometimes found in the *Eurotia lanata*, and some other chenopodiaceous plants are eaten by sheep. Frémont and Carrington Islands in Salt Lake are occupied as sheep pastures by the Mormons, though the amount of grass is small and there is a supply of only brackish water for much of the year.

The possibility of the more general cultivation without irrigation of some forms of perennial or woody vegetation is an interesting question. That there can be to a certain extent a vigorous growth of such plants with only the ordinary natural supply of moisture is certain from the number of prevalent species of this character, and it seems not chimerical to believe that with the necessities of a future more crowded population there will be found either profitable use for these or more serviceable substitutes that shall be equally capable of thriving under the present climatic conditions.

The source of supply of the moisture by which life is sustained in these plants through the droughts of summer has been a matter of doubt. It has been supposed either that they are in some degree air-plants, drawing the requisite moisture from the atmosphere itself, or that the structure of the leaf-surface and the pubescence or glutinous secretion that often covers them prevent in a great measure the usual evaporation of the juices of the plant. It is true that in many of the localities where there is no diminution in the amount of vegetation water cannot be found but by digging to a great depth. At Stockton Station, in a valley 20 miles east of Virginia City, between

mountains nearly 3,000 feet high, the depth of the well is 290 feet, though with 150 feet of water on 31st July, 1867. At Nevada Station, six miles distant and 129 feet lower, the well was 110 feet deep with but fifteen inches of water at the same date. In Unionville Valley at Olive Ranch on Coyote Creek, six miles east of the summit of Star Peak, a well was sunk 104 feet through gravel without finding water. In Humboldt Valley east of the Eugene Mountains and in the border of a large sandy plain covered by an unusually large growth of *Artemisia* a well was sunk to as great a depth but without success. Not to multiply instances, it is at least frequently the case that in the deposits which fill the valleys there are no strata of clay or rocks to intercept and retain the water near the surface.

To test therefore in a measure the ability of the most prevalent forms of foliage to resist the absorbent power of the air, some experiments were made by Mr. King's direction, with results as shown in the following table. The specimen of *Artemisia* selected was young and vigorous, six years old, the weight of the portion above ground being 24 ounces, or 776 grammes, of which the woody portion weighed 384 grammes or nearly 50 per cent. Of the remaining green stems and leaves, the leaves contributed 79 per cent., or nearly 40 per cent. of the whole. Of *Tetradymia canescens* branches only were taken. One specimen gave 35 per cent. of wood, 8 per cent. of the previous years growth, and 57 per cent. of new shoots and leaves, and a second specimen 53 per cent. of wood to 47 per cent. of young shoots. A branch of a larger plant gave 150 grammes of young stems to 98 grammes of wood, or over 60 per cent. Smaller branches of a more pubescent form gave 67 per cent., and in a second instance 60 per cent., of young twigs and leaves. Different branches of *Linosyris viscidiflora* gave 66, 70, and 80 per cent. of leaves and twigs, and a specimen of *L. graveolens* 55 per cent. *Purshia tridentata* in two trials gave 61 per cent., and *Prunus demissa* 55 and 68 per cent. In all these cases the leaves and twigs were still green and fresh, though in the fourth week of July. In September and October the weight of the leaves and fruit of *Obione confertifolia* was 82 per cent. of that of the entire branch.

It is hence evident that there is no deficiency in the extent of leaf surface exposed to the action of the atmosphere, nor in any instance does there seem to have been any unusual want of succulence, the moisture lost amounting sometimes to nearly or quite 50 per cent. of the whole substance.

*Plant Evaporation.*

| Portion of plant. | Weight in grammes. | When exposed. | Length of exposure. | Loss per cent. | Additional exposure. | Additional loss. | Thermometer. Hour. | Dry bulb. | Diff. of wet bulb. | Black bulb. | Notes. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. ARTEMISIA TRIDENTATA. *July* 21, 1868. | | | | | | | | | | | |
| | | | *h. m.* | | *h. m.* | | | °F. | °F. | °F. | |
| Young leaves..... | 6.62 | 12.45 p. m. | 4 50 | 55 | 24 00 | 5 | 1 00 p. m. | 81.6 | 21.3 | 156.0 | |
| Stems..... | 2.21 | 12.45 p. m. | 4 50 | 44 | 24 00 | 12 | 2 00 p. m. | 81.2 | 22.5 | 150.2 | |
| Older leaves...... | 20.24 | 1.15 p. m. | 4 35 | 35 | 24 00 | 18 | 3 00 p. m. | 79.5 | 22.5 | 140.0 | |
| Stems...... | 5.44 | 1.15 p. m. | 4 35 | 23 | 24 00 | 15 | 4 00 p. m. | 79.5 | 23.1 | 162.0 | |
| Stems and leaves.. | 50.84 | 1.30 p. m. | 4 45 | 34 | 24 00 | 16 | 5 00 p. m. | 77.4 | 22.2 | 148.0 | |
| Flowering stems.. | 19.33 | 1.45 p. m. | 4 30 | 30 | 24 00 | 15 | 6 00 p. m. | 73.3 | 19.7 | ........ | |
| 2. TETRADYMIA CANESCENS. *July* 22, 1868. | | | | | | | | | | | |
| Branch ........... | 26.29 | 9.15 a. m. | 3 45 | 30 | 5 45 | 12 | 9 00 a. m. | 74.3 | 14.0 | 154.8 | |
| Branch ........... | 13.81 | 3.45 p. m. | 3 15 | 32 | ....... | .... | 10 00 a. m. | 80.1 | 20.8 | 156.2 | Older plant. |
| Branch ........... | 15.46 | 3.45 p. m. | 3 15 | 25 | ....... | .... | 12 00 m. | 83.7 | 26.9 | 155.0 | |
| Branch ........... | 13.18 | 3.55 p. m. | 3 5 | 17 | ....... | .... | 4 00 p. m. | 80.9 | 25.5 | 155.0 | More pubescent variety. |
| Branch ........... | 16.19 | 3.55 p. m. | 3 5 | 15 | ....... | .... | 6 00 p. m. | 75.3 | 13.9 | ........ | |
| 3, 4. LINOSYRIS VISCIDIFLORA AND GRAVEOLENS. *July* 23. 1868.* | | | | | | | | | | | |
| Branch ........... | 16.48 | 8.50 a. m. | 1 10 | 9 | ....... | .... | ............... | ...... | ...... | ........ | L. viscidiflora. |
| Branch ........... | 9.24 | 8.55 a. m. | 1 5 | 9 | ....... | .... | ............... | ...... | ...... | ........ | |
| Branch ........... | 30.19 | 10.00 a. m. | 1 15 | 26 | ....... | .... | ............... | ...... | ...... | ........ | L. graveolens. |
| Leafy stems....... | 19.23 | 10.45 a. m. | 0 5 | 3 | 0 22 | 4 | ............... | ...... | ...... | ........ | In shade. |
| | | ........... | ...... | .... | 1 48 | 29 | ............... | ...... | ...... | ........ | In sun. |
| 5. PRUNUS DEMISSA. *Same day.* | | | | | | | | | | | |
| Branch ........... | 19.73 | 4.10 p. m. | 0 17 | 3 | ....... | .... | ............... | ...... | ...... | ........ | |
| Branch ........... | 5.12 | 4.15 p. m. | 0 31 | 9 | ....... | .... | ............... | ...... | ...... | ........ | |
| Leaves ........... | 34.77 | 4.20 p. m. | 0 24 | 4 | ....... | .... | ............... | ...... | ...... | ........ | |
| 6. OBIONE CONFERTIFOLIA. *Sept.* 27 *and Oct.* 5, 1868. | | | | | | | | | | | |
| Leaves ........... | 41.71 | 12.00 m. | 2 00 | 22 | ....... | .... | 12 00 m. | 78.7 | 21.2 | ........ | Sept. 27, sky clouded. |
| Stems..... | 9.22 | 12.00 m. | 2 00 | 5 | ....... | .... | 1 00 p. m. | 80.4 | 23.6 | ........ | |
| Leaves and fruit... | 70.22 | 9.30 a. m. | 5 00 | 28 | ....... | .... | 9 30 a. m. | 67.7 | 11.7 | ........ | Oct. 5. |
| Stems..... | 14.81 | 9.30 a. m. | 5 00 | 11 | ....... | .... | 1 30 p. m. | 75.0 | 15.5 | ........ | |

* The thermometrical record for this date is given in full in the table on page xxii.

It must be confessed that these experiments were conducted with too little method and are too incomplete to be fully satisfactory. The amount of loss as here shown is doubtless greater than it would have been from the same leaves and stems when attached to the plant, yet making a probably full allowance for this source of error it appears that the ordinary drain upon the juices of these plants must be large. Comparing the recorded amounts of water evaporated from an open vessel during the same hours with that

for the whole 24 hours and making it the basis of a calculation of the daily loss of the plant, the first mentioned specimen of *Artemisia* appears to have exhaled 9 ounces of water daily, or an amount equal to three-eighths of its weight. Even in the last trials later in the season, when leaves and stems had probably their fullest dryness and hardness, with one of the most waxy and scurfy of the *Obiones*, and moreover under atmospheric conditions more favorable for the plant, the loss was at least half as great.

Notwithstanding therefore the apparent want of moisture in the soil, it must be the reservoir from which vegetation draws its entire supply. The loose character of the deposits which fill the valleys and form the foothills not only allows a ready passage for the roots to any necessary depth but especially, through the force of capillary attraction, compels the retention or absorption from beneath of a sufficient amount of water for the temporary extraordinary needs of these perennial species. And this natural resource of the vegetation must be taken into account as greatly favoring the possibility of the successful introduction of orchard, vineyard or other tree-culture in these at present desert territories.

Conclusion. The present condition of the Botany of our western flora is such as to render a satisfactory determination of the species of any collection a matter of some difficulty. The descriptions of many of the genera and species are scattered, without clue to guide in the search for them, through numerous volumes of government reports and periodical publications of this country and of Europe, not always readily accessible. The synonomy is somewhat confused, and in the case of various genera revisions are much needed, with a collation of all the existing materials, a work which is going on under the hands of Dr. Gray, Dr. Engelmann and others.

In the examination of the present collection use has been made almost exclusively of the herbariums of Dr. Gray, Dr. Torrey and Prof. Eaton, which are the richest in original and authenticated specimens of western species and to which, with their accompanying libraries, free access was most generously given with every facility for study and comparison. So far as the work has been performed by others the names carry their own sufficient authority. As for the rest it can only be claimed that care and effort have not been spared to secure correctness.

The trouble experienced in making available the authorities upon western species gradually suggested the extension of the Catalogue beyond the usual

limits of such papers, including in it descriptions generic and specific whenever they are not to be found in the popular manuals of the eastern floras. The method pursued is that which seemed simplest and best adapted to the end in view, and scarcely needs elucidation. To this have been added in the Appendix concise synopses of most of the more recently revised genera, thus bringing together a considerable amount of material that may be found of use by those who have not ready access to the fuller original papers. Among these synopses are revisions of a few genera, (*Orthocarpus*, *Abronia* and *Allium*,) which were prepared in connection with the present work.

The collection, comprising about 19,000 specimens available for study, but not all ranking as herbarium specimens, is distributed into sets, of which the most complete belongs to the Herbarium of the Agricultural Department at Washington. The second is due to Prof. Eaton at Yale College, and the remaining sets will be donated to such herbariums as may be designated.

There now remains but the pleasant duty of grateful acknowledgment of favors and assistance received during the course of the work. Especially to Prof. DANIEL C. EATON is the fullest expression of thanks due for all the facilities afforded by his well-appointed herbarium-room, placed at my command from the outset of the work, for the constant use of his library and the procurement of needed books of reference, and for assistance of every kind rendered in innumerable instances, always most kindly and generously. By him also the *Compositæ* of the collection, comprising of one-seventh of the whole, were carefully determined and the resulting paper forms one of the most valuable portions of the Catalogue. Assistance in various portions of the work has likewise been received from Dr. GRAY and Dr. TORREY, in addition to the free use of their herbariums whenever desired. Dr. GEORGE ENGELMANN, also, of St. Louis, has made ready response to every application for information and aid, and the articles of Col. OLNEY on the Carices, of Mr. JAMES on the Mosses, of Dr. ROBBINS on Potamogeton, and of Prof. TUCKERMAN on the Lichens, all prompt and thorough in whatever they have undertaken, show that the most that was possible has been made by them of the material that was furnished.

SERENO WATSON.

AUGUST 26, 1871.

NORTHERN NEVADA AND NORTHWESTERN UTAH.

MAP OF ROUTES.

# CATALOGUE

OF THE

## KNOWN PLANTS OF NEVADA AND UTAH, WITH DESCRIPTIONS OF SUCH OF THE PHÆNOGAMOUS GENERA AND SPECIES AS DO NOT OCCUR EAST OF THE MISSISSIPPI RIVER.


THE CACTACEÆ .......... BY DR. GEORGE ENGELMANN.

THE COMPOSITÆ .......... BY PROF. DANIEL C. EATON.

THE POLEMONIACEÆ AND ERIOGONEÆ .......... BY DR. ASA GRAY.

THE NAIADACEÆ .......... BY DR. J. W. ROBBINS.

THE CARICES .......... BY STEPHEN T. OLNEY, ESQ.

THE FILICES .......... BY PROF. DANIEL C. EATON.

THE MUSCI .......... BY THOMAS P. JAMES, ESQ.

THE LICHENES .......... BY PROF. EDWARD TUCKERMAN.

# CATALOGUE, &c.

## RANUNCULACEÆ.

CLEMATIS DOUGLASII, Hook.[1] Stem herbaceous, erect, 1-2° high, simple, 1-flowered; leaves 2–3-pinnatifid, (or the lower ones more simple,) the segments linear or linear-lanceolate, both stem and leaves more or less hairy; flower nodding, the naked peduncle erect and elongated in fruit; sepals thick, woolly at the apex, more or less spreading, deep brownish-purple, paler externally.—The specimens resemble those from Oregon described by Nuttall under the name of *C. Wyethii*, differing from the form figured by Hooker and of the eastern Rocky Mountain collections only in the broader divisions of the leaves. In the mountains from Washington Territory to Colorado. Found in the Wahsatch and Uintas, Utah, at an altitude of 6–7,000 feet; July, in flower and fruit. (1.)[2]

CLEMATIS LIGUSTICIFOLIA, Nutt. Climbing, somewhat pubescent; flowers white, diœcious, in paniculate corymbs; leaves pinnate and ternate, (mostly 5-foliolate,) the coriaceous leaflets usually oblong, lanceolate, more or less laciniately toothed and trifid; petals and stamens equal. Var. BREVIFOLIA, T. & G. With nearly smooth broadly ovate subcordate 3-lobed leaflets.—On the banks of mountain streams from Washington Territory to the Saskatchewan, and southward to Lower California and New Mexico. Frequent in the lower cañons of the West Humboldt Mountains and found in a single locality in the East Humboldt range, Nevada—the broad-leaved variety only; altitude, 5-6,000 feet; August–October. An approach to the typical form was also found at City of Rocks, in Southeastern Idaho. (2.)

CLEMATIS ALPINA, Mill. *DC. Prodr.* 1. 10. Leaves bi-ternately divided; segments ovate or oblong-lanceolate, acuminate, frequently 3-lobed, irregularly

[1] A large portion of the described species up to the end of the *Compositæ* are to be found in Torrey and Gray's *Flora of North America*, and a general reference to that work for the synonymy, &c., is to be understood. In case of other species not occurring in the *Flora*, express reference is usually made simply to De Candolle's *Prodromus*; or to still later revisions, or for more recent species, to the publications in which they are described.

[2] Figures in parentheses, at the close of a paragraph, indicate the number under which the specimens of the collection are distributed.

toothed. Var. OCHOTENSIS, with linear antheriferous petals.—A trailing woody-stemmed plant, 6′ high, glabrous but for a few scattered silky hairs. *C. alpina* and *Sibirica*, Mill., and *Ochotensis*, Poir., differ only in the degree of development of the petals. Rocky Mountains of Colorado and New Mexico. In Utah it was seen only in the Wahsatch Mountains, (Cottonwood Cañon,) at an altitude of 8–9,000 feet; July, in flower and fruit. (3.)

CLEMATIS VERTICILLARIS, DC. On wooded mountain sides; a low climber. From North Carolina to Maine, along the great lakes, northward to latitude 54°, and west to the Rocky Mountains and Washington Territory; also found in Northern California. Not rare in the Wahsatch and Uinta Mountains, Utah, at an altitude of 7–9,000 feet; in flower and fruit, July to August. The specimens accord with the description of *C. Columbiana*, T. & G., having rather small, more narrowly sepaled flowers, but it scarcely deserves to rank as a distinct variety. (4.)

THALICTRUM ALPINUM, L. Stem simple, nearly naked; leaves 2–3-ternate; leaflets roundish, somewhat lobed, crenately toothed; flowers perfect, in a simple raceme, nodding; filaments filiform; anthers oblong-linear; carpels few, ovate, sessile; stigmas thick and pubescent.—Low, stems 2–8′ high, much exceeding the mostly radical leaves; slightly pubescent. Islands of the Gulf of St. Lawrence; Greenland; Behring Strait; and Rocky Mountains of Colorado. Found in the Clover Mountains, Nevada, on a damp grassy bank, at an altitude of 10,000 feet, with *Vaccinium cæspitosum*, and *Salix reticulata;* in fruit, September. (5.)

THALICTRUM SPARSIFLORUM, Turcz. (*T. clavatum*, Hook., not of DC.) 1–2° high; panicle loosely few-flowered, long pedicelled; flowers perfect; filaments clavate; anthers elliptical, pointless; ovaries 8–10; carpels compressed, dimidiate, not striate, short-stipitate, thrice longer than the persistent style; upper leaves sessile, 2–3-ternate; leaflets often small.—Collected by Dr. Richardson in the Saskatchewan region, latitude 57°, and by Dr. Parry and others in Colorado. Found in the Uinta Mountains, only in Provo River Cañon, at an altitude of 7,000 feet; July. Identical with Siberian specimens. (6.)

THALICTRUM FENDLERI, Eng. *Pl. Fendl.*, *p.* 5. Diœcious, glabrous; leaves petioled or the uppermost sessile; filaments capillary; anthers linear, mucronate; carpels ovate, compressed, oblique, sharp-edged, with 4–6 strong lateral ribs, tapering into the long persistent style; sessile or shortly stipitate.—

Very near *T. dioicum*, from which it is most readily distinguished by the carpels; 2–3° high; somewhat variable in its foliage. From New Mexico to California and northward to British America. Rare in the East Humboldt Mountains; more frequent in the Wahsatch, at an elevation of 6–9,000 feet; June–August. It is the *T. Cornuti* of Lyall's Oregon collection, *T. heterophyllum*, Nutt. MSS. in Herb. Gray, and probably *T. megacarpum*, Torr., of Frémont's Report. (7.) A form was also collected with the leaflets nearly orbicular, entire or 3-lobed. (8.)

Var. (?) With stamens mingled with the less compressed strongly ribbed fruit, the styles deciduous, the raceme short and dense, and the leaves extremely large, 1′ or more in diameter; a very doubtful form. Wahsatch Mountains, Provo Cañon; 6,000 feet altitude. (9.)

ANEMONE MULTIFIDA, DC. Most of the specimens have but a single head; flowers light-purple. It is the same as the South American plant, but seems clearly distinct from *A. decapetala*, with which it is united by Dr. Hooker. It is the *A. lanigera*, Gay, of Chili. From Vermont and Canada to Oregon and Arctic America. Found on the East Humboldt and Clover Mountains of Nevada, and more frequently in the Uinta Mountains, Utah, on dry rocky ridges, at an elevation of 9–12,000 feet; July–September. (10.)

ANEMONE DECAPETALA, L. (*A. Caroliniana*, Walt.) Two imperfect fruiting specimens (one with four heads) of what appears to be this species were found on Stansbury's Island in Salt Lake, Utah; altitude 4,500 feet; June. From the Carolinas to Missouri, Colorado, New Mexico, and Arizona. (11.)

MYOSURUS MIMIMUS, L. From Georgia and Illinois westward to the Pacific. Found only in a meadow near the mouth of Jordan River, Salt Lake Valley, with the next. (12.)

MYOSURUS ARISTATUS, Benth. *Lond. Jour. Bot.* 6. 458. Spikes oblong or linear, with few to very many achenia, which are beaked with a divergent persistent style nearly equaling the achenium.—Ordinary starved specimens have short few-carpeled heads, but under favoring circumstances it sends up numerous sub-decumbent scapes, with linear many-fruited heads, as in *M. minimus*. Found growing in the shade of sage-brush in the valley of Carson River, Nevada, and of Salt Lake; 4,500 feet altitude; collected also by Ives in Western Arizona. April–June. A Chilian species. (13.)

RANUNCULUS AQUATILIS, L., Var. TRICHOPHYLLUS, Chaix. The most common form of the species; from the Eastern States and the Alleghany region

north to the Arctic Sea and Greenland, and west to California. Found in Truckee and Ruby Valleys, Nevada, and in Parley's Park, Utah; altitude, 4,300–6,000 feet; May–September. Var. *brachypus*, T. & G., from California, is a short-peduncled form of this. (14.)

Var. STAGNATILIS, DC. (*R. divaricatus*, of Gray's Manual.) Frequent forms occur connecting this variety with the last. It can hardly be *R. divaricatus*, Schrank, as European and Asiatic specimens of that species show a well-defined lamina to the segments of the leaves, while in American specimens they are always filiform. The fruit of the two varieties varies in the degree of hispidness and acuteness of the achenia, and affords no reliable distinctions. Northern States and British America. Collected in Secret Valley, Nevada, and near Salt Lake City, Utah; 4,300–6,000 feet altitude; May–September. (15.)

RANUNCULUS ANDERSONII, Gray. *Proc. Amer. Acad.* 7. 327. Leaves radical, palmately 2-ternate, segments laciniately cleft, petiolulate; scape 1-flowered; calyx glabrous, persistent; achenia 4–5″ long, thin and vesicular, obovate, compressed, with a narrow ventral wing and slightly margined dorsally, glabrous, mucronate with a very small subulate recurved style; seed cylindrical, (1–1½″ long,) narrowly winged along the entire ventral margin, attached above the base of the achenium.—Plant 3–6′ high, with a coarsely fibrous, almost fascicled root, either wholly glabrous or the dilated petioles and lobes of the leaves sparingly ciliate with whitish deciduous hairs; scape exceeding the somewhat fleshy leaves; flower 1′ in diameter, with occasionally a lobed bract near the base; petals suborbicular, with a narrow claw and small nectariferous scale, deep-pink, the nearly equal sepals margined with the same color; wing of the seed extending beyond the rhaphe both above and below. The somewhat petaloid sepals and the withered petals are persistent at the base of the dense globular heads (9″ in diameter) of maturing fruit. In several respects this is a remarkable species in the genus *Ranunculus*. "The fruit of this species, now first collected, is strikingly different from that of *R. glacialis* and *Chamissonis*, yet of the same type, showing that the affinity of the species had been rightly estimated. The akenes are several times larger, thinner, and more bladdery, tipped with a proportionally very short style, the dorsal edge more or less margined toward the base, but without the wing which is so conspicuous in *R. glacialis*. The long and terete seed, very small in proportion to the cavity,

is inserted above the base, often very considerably so." (Gray, MSS.) From the east foot of the Sierras to Salt Lake, on the foot hills, and occasionally in the cañons, at an altitude of 5–9,000 feet. May–July. PLATE I. Fig. 1. A plant in flower; natural size. Fig. 2 and 3. Sepal and petal; enlarged two diameters. Fig. 4. Matured head, showing the receptacle, the persistent calyx and marcescent corolla, and a portion of the achenia; natural size. Fig. 5. Achenium, twice the natural size, with one side removed, showing the seed in position and the ventral wing. Fig. 6 and 7. The winged seed with its rhaphe, and the embryo; enlarged four diameters. (16.)

Var. TENELLUS. More delicate and slender; stems 1° high, with sometimes a leaflet above the middle similar to the radical leaves; petals and achenia rather smaller, and the latter less numerous and crowded. Pilot Rock Point, Salt Lake, Utah. PLATE I. Fig. 8. Plant; natural size. Fig. 9 and 10. Petal and sepal; enlarged two diameters. (17.)

RANUNCULUS ALISMÆFOLIUS, Geyer., Var. MONTANUS. Low (6′ high,) alpine; stems ascending; leaves entire; carpels rather shorter-beaked than usual in the species.—It is 79 Parry and 15 Vasey, from Colorado, and 1684 Brewer, from Lake Tenago, in the Sierra Nevada. The species is distinguished from *R. Flammula* not only by the longer-beaked achenia, but also by the more prominent scale and deeper nectary of the larger petal. Shore of Marian Lake in the East Humboldt Mountains, Nevada, and at the head of Provo River in the Uintas; 9,000 feet altitude; June–August (18.)

RANUNCULUS FLAMMULA, L., Var. REPTANS, Gray. New England to California and northward to the Arctic Ocean. Found only on the upper Bear River in the Uinta Mountains, Utah; 8,000 feet altitude; August. (19.)

RANUNCULUS CYMBALARIA, Pursh. The most abundant of the species occurring in Nevada and Utah, preferring subsaline or alkaline soils; 4–6,000 feet altitude; May–September. From New Jersey and the Great Lakes to California, and northward to the Arctic Circle. (20.)

RANUNCULUS AFFINIS, Br. Radical leaves petioled, usually pedately multifid; cauline ones subsessile, digitate, with broadly linear lobes; stem erect, few-flowered; carpels with recurved beaks, in oblong-cylindrical heads; more or less pubescent throughout.—Referred by Dr. Hooker to *R. auricomus*, from which it differs only in its oblong heads. Var. LEIOCARPUS, Trautv., with the lower leaves less divided, slightly lobed or only deeply crenate; 1–1½° high; flowers rather small and carpels somewhat pubescent Growing in the Uinta

and Wahsatch Mountains, at an altitude of 6–9,000 feet; July, August. It is 15 Hall & Harbour, 13 Vasey, and 80 Parry in part, from Colorado; previously reported only from the Arctic coast. (21.)

Ranunculus glaberrimus, Hook. Glabrous; leaves petioled, entire or 3-toothed, or the cauline ones 3-cleft, oblong or lanceolate, obtuse; heads globose.—Root fibrous-fascicled; stem 2–4′ high, 1–3-flowered; corolla an inch in diameter; petals broadly obovate, twice the length of the calyx, the nectary a broad tube 1″ in depth—in this respect resembling *R. Lingua.* In the Rocky Mountains of Oregon, Washington Territory, and Idaho. Washoe Mountains, near Carson City, Nevada, where it was also found by Dr. Anderson; 5–6,000 feet altitude; April, May. (22.)

Ranunculus sceleratus, L. Atlantic States and Canada to the Arctic Circle; collected by Bourgeau and Geyer, in the Rocky Mountains, and also by Nuttall and Frémont on the head-waters of the North Platte. Found in Ruby Valley, Nevada, and in Salt Lake Valley, Utah; altitude 5–6,000 feet; May–October. (23.)

Ranunculus multifidus, Pursh., Var. δ repens, Hook. Creeping, with the leaves all round-reniform, palmately 3–5-cleft.—Arctic America; also Rocky Mountains of Colorado. Weber Valley, Utah; altitude 5,500 feet; August. *R. limosus*, Nutt., from the head-waters of the Snake River, has still more divided leaves and is Var. γ, Hook. (24.)

Ranunculus digitatus, Hook. *Kew. Jour. Bot.* 3. 124, t. 4. Dwarf; very glabrous; root grumous; leaves few, petioled, digitately or somewhat pedately lobed, the 3–5-segments narrowly lanceolate, or oblong-spatulate, obtuse; flowers 2–3, terminal, with reflexed sepals and 7–11 oblong cuneate petals; fruit subglobose, the carpels beaked with the subulate recurved style.—Stem 2–3′ high, simple; flowers 9″ in diameter. Collected previously only by Burke, near Fort Hall, in Southeastern Idaho; now found on Mt. Tobin Range, above Cumberland, Nevada, and by Prof. D. C. Eaton, in the Wahsatch, near Cottonwood Lake; altitude 9,000 feet; June. (25.)

Ranunculus nivalis, Br. Radical leaves dilated, lobed; lobes somewhat ovate; cauline leaves palmate; stem about 1-flowered; calyx very hirsute, shorter than the petals; style equaling the glabrous ovaries; heads subglobose. Var. Eschscholtzii. (*R. Eschscholtzii*, Schlecht.) Radical leaves 3-lobed, lateral lobes somewhat divided, sparsely ciliate; calyx less hirsute, with whitish hairs; styles shorter than the achenia.—The stems are described as

erect, but are more usually ascending or decumbent; flowers larger than in *R. affinis*, small forms of which it approaches, but from which it is easily distinguished. Rocky Mountains of Colorado and British America to Alaska. It is 80 Parry, 14 Hall & Harbour, and 17 Vasey. Found on the East Humboldt and Clover Mountains, Nevada, and on the Uintas, at an elevation of 9-10,000 feet; July–September. (26.)

RANUNCULUS REPENS, L. From Canada and the Atlantic States to the Pacific. Found in the valleys of Northeastern Nevada, and the cañons of the Wahsatch Mountains; altitude, 6,000 feet; usually with small flowers and growing in much wetter localities than the next. (27.)

RANUNCULUS MACRANTHUS, Scheele. *Linnæa*, 21. 585. Root fascicled; stem erect, more or less hirsute with spreading hairs; branches short, erect, few-flowered; leaves ternately, or, more frequently, bi-ternately divided; segments usually petiolulate, laciniately lobed and toothed; flowers large, with the sepals strictly reflexed; carpels (1½″ long) crowded in subglobose heads, about equaling the broad subulate beaks.—This is *R. repens*, Var. *macranthus*, Gray, but it seems sufficiently well marked to retain its place as a distinct species by its stout erect habit, uniformly large flowers with reflexed sepals, and especially by the long diverging beaks of the carpels. Texas, California, (4,729 Bolander,) and Oregon, (Lyall.) Streambanks in the Wahsatch and Uintas; 5–8,000 feet altitude; June, July. (28.)

RANUNCULUS FASCICULARIS, Muhl. The leaves are less divided than usual; radical ones ternate, leaflets 3-lobed, lobes mostly entire; cauline ones with the leaflets linear-lanceolate and nearly entire; flower small. Canada to Pennsylvania and Wisconsin; collected by Lyall in Washington Territory, and California by Mrs. A. J. Davis, and Professor Brewer (4,631.) Foot of the Washoe Mountains, near Carson City, Nevada; May. (29.)

RANUNCULUS ORTHORHYNCHUS, Hook. Erect, slender, sparsely hirsute with appressed hairs; radical leaves petioled, upper ones sessile, 3-foliolate, leaflets linearly many-cleft, with white callous points; sepals reflexed, half the length of the petals; carpels glabrous, compressed, strongly margined, shorter than the nearly straight style. Var. ALPINUS; low, nearly or quite glabrous, stems ascending.—The large form occurs in low lands in Washington Territory; the variety, in the Wahsatch Mountains, at an altitude of 10,000 feet; July. It is perhaps *R. amœnus*, Gray, of the Colorado collections, which has been found only with immature fruit. (30.)

Caltha leptosepala, DC. Stems (3′–1° high) erect, 1-flowered; leaves radical, ovate-cordate, obscurely crenate; carpels beaked with the short recurved style; sepals white, or tinged with blue.—Subalpine swamps, Colorado to California and Washington Territory. Found in the East Humboldt and Clover Mountains, Nevada, and in the Wahsatch, Utah; 9–10,000 feet altitude; July–September. (31.)

Trollius laxus, Salisb. Sepals dull greenish-white or yellowish. New Hampshire to Delaware and Michigan, and on the eastern slope of the Rocky Mountains, from Colorado to latitude 55°. Uinta Mountains, Utah; 9,000 feet altitude; July, August. (32.)

Aquilegia Canadensis, L., Var. formosa, Torr. Tall, 2–3° high, nearly naked above, the limb of the petals 1–2″ long, the spurs never greatly exceeding the reflexed sepals; styles shorter than the stamens.—The parts of the flower of this prevalent and perhaps distinct western *Aquilegia* are so variable that *A. truncata*, Fisch. & Mey., (*A. Californica*, Lindl. and *A. eximia*, Van Houtte,) can with difficulty be separated from it. California to Alaska; not unfrequent on mountain streams in Nevada, at an elevation of 6–7,000 feet, but not seen in Utah. June–September. (33.)

A subalpine form has the stem nearly simple, few-flowered; uppermost leaflets entire, oblong or oval; sepals oval, equaling or exceeding the spurs. East Humboldt Mountains, Nevada; 8–9,000 feet; July, August. (34.)

Aquilegia flavescens. Spurs more or less incurved and tipped, shorter than the spreading or reflexed oval or oblong-ovate sepals; limb large (3–4″ long) and dilated; styles nearly equaling the long exserted stamens.—2–3° high; glabrous, with the carpels and peduncles pubescent; flowers yellow, the sepals (½–1′ long) frequently tinged with scarlet. Wahsatch and Uinta Mountains, Utah; 5–7,000 feet altitude; May–July. It has been collected also by Lyall on the the Oregon boundary, and by Bourgeau in the Rocky Mountains, and referred provisionally to *A. Canadensis*. A comparison of a large number of specimens leaves no doubt that it is distinct. (35.) A more alpine form has much smaller leaves and flowers, with the stem sometimes subpubescent. (36.)

Aquilegia cærulea, James. Spurs straight, very slender, 2′ long; sepals rhomboid-ovate, longer than the limb; stamens and styles shorter than the corolla.—Stem 2° high; glabrous, few-flowered; flowers 3′ in diameter, white in all the specimens of the collection or with the sepals very lightly tinged

with blue. Colorado to the Sierra Nevadas. Wahsatch and Uinta Mountains, Utah, on shaded mountain slopes, 7–9,500 feet altitude; June–August. (37.)

DELPHINIUM ELATUM, L., Var. (?) OCCIDENTALE. Tall, (5° high,) glarous, or densely pubescent above; leaves deeply 3–5-cleft, the divisions broadly cuneate, somewhat 3-lobed and sparingly gash-toothed, the teeth narrowing abruptly to a callous point; racemes many-flowered, (often densely so,) simple or panicled; flowers pubescent, frequently white; spur longer than the sepals; lower petals broad, slightly notched, often erosely dentate, more or less densely bearded, the claw spurred at base.—It is difficult to determine satisfactorily the relations of this plant. It is the *D. exaltatum* of Bourgeau's collection; also the *D. elatum*, Var., of Parry, and Hall & Harbour, from Colorado, though with longer and usually much more glabrous racemes of smaller flowers. It differs from the smaller *D. scopulorum* in its much less laciniately dissected leaves, and in the lower petals being broader and less deeply lobed, while it seems to be as much unlike European specimens of *D. elatum*, in which also the claw of the lower petal is less conspicuously spurred. 1940 of Brewer's California collection, considered a good *D. scopulorum*, has the size and nearly the same foliage, but with all the petals narrow and bifid. On stream-banks in the East Humboldt and Clover Mountains of Nevada, and in the Wahsatch, 7–8,000 feet altitude; July–September. (38.)

DELPHINIUM MENZIESII, DC. "Pubescent; leaves 5-parted, divisions 2–3-cleft; lobes mostly linear, entire; lower bracts 3-cleft; raceme 3–6-flowered; spur straight, as long as the sepals; ovaries somewhat tomentose; root grumous."—The limits of this species (wherever they may be) scarcely accord with this description. It is the prevalent species on the foothills of Nevada, and a suite of numerous specimens shows a usually scanty pubescence; stem rather stout, 1–2° high; the leaves orbicular in outline, 5–7-parted, divisions more or less deeply 2–3-cleft; bracts mostly entire; racemes simple, loosely few-to many-flowered; spur usually curved, longer than the sepals, ascending; capules glabrous. It differs but little from *D. tricorne* of the East, and approaches some of the other reputed species of California. From Southern California to Behring Strait; Colorado. Abundant throughout Western Nevada; 4–5,000 feet altitude; May–July. (39.) It is occasionally seen with pink flowers, (40,) and very rarely with the flowers double. (41.)

Var. UTAHENSE. Segments of the leaves usually more deeply cleft, lobes linear and acute; the upper petals delicately veined with blue, which occurs in none of the Nevada specimens. On Antelope Island, Salt Lake, and in the Wahsatch Mountains; altitude 4,500–9,000 feet; May–July. It was also collected by Tolmie in Southern Idaho, and by Stansbury near Salt Lake. (42.)

DELPHINIUM DEPAUPERATUM, Nutt. Leaves and lower part of the stem glabrous, upper part and the carpels densely villous; leaves reniform, 3–5-parted, the lobes entire or 2–3-cleft, oblong and rather broad; bracts simple, minute; raceme 1–5-flowered; spur subulate, straight, longer than the oblong obtuse sepals; root grumous.—This seems to be a well-marked species; more slender and delicate than *D. Menziesii*, and more often alpine. It has not been reported since collected by Nuttall in the Blue Mountains of Oregon. Found near streams on the Mt. Tobin range and on the East Humboldt Mountains, Nevada; 5–10,000 feet altitude; June–August. (43.)

ACONITUM NASUTUM, Fisch. Petals erect, with a strongly arcuate spur; galea broadly conical, prone, beak projecting; raceme somewhat panicled; divisions of the leaves rather broad, coarsely laciniate-toothed.—Stem stout, 3–6° high, pubescent, at least above; flowers purple or white. Colorado to California, and northward. Found in moist shaded cañons, Eastern Nevada and Utah; 7–8,000 feet altitude; July–September. (44.)

ACTÆA SPICATA, L., Var. ARGUTA, Torr. (*A. arguta*, Nutt.) A larger plant than var. *rubra*, with larger and more serrated leaflets and oblong petals; scarcely differing otherwise. Most of the Utah specimens are nearly var. *rubra*. Fruit red or white. From the Columbia River to the Sacramento. East Humboldt Mountains, Nevada, and in the Wahsatch, Utah; 6–7,000 feet altitude; May–August. (45.)

PŒONIA[1] BROWNII, Dougl. Glabrous and glaucous; stems decumbent, 6–12′ long; leaves 1–2-ternate, leaflets ternately divided or pinnatifid; petals deep brownish-purple, 6–9″ in diameter; carpels 3–5, inverted in fruit.—From Southern California to the Columbia. Found in the Carson Valley, and in the East and West Humboldt ranges, Nevada; 4,500–8,000 feet altitude; April–June. (46.)

[1] PŒONIA, L. Sepals 5, imbricated, herbaceous, persistent. Petals 5–10, broad and conspicuous, without nectary. Carpels 2–5, many-ovuled, surrounded by a fleshy disk, coriaceous and folliculate-dehiscent at maturity. Seeds large, with fleshy albumen.—Perennial herbs, with alternate pinnately dissected or decompound leaves. BENTH. & HOOK.

## BERBERIDEÆ.

Berberis Aquifolium, Pursh. Leaflets 1–6 pairs, not approximated to the base of the petiole, coriaceous, 1-nerved, ovate-lanceolate or elliptic-oblong, oblique and slightly cordate at base, repand with numerous spinulose-cuspidate teeth; racemes nearly erect, clustered; berries purple.—The form originally described by Pursh, and occurring in New Mexico, Colorado, and westward, (the *B. repens* of Lindley,) is low, rarely exceeding six inches in height, with about two pairs of leaflets. The larger shrub of Oregon, where it is commonly known as the "Oregon grape," is 2–6° high, with more numerous leaflets. The nearly allied *B. pinnata*, Lag., seems confined to California south of the Sacramento, Arizona, and New Mexico. Diamond and East Humboldt Mountains, Nevada, and in the Wahsatch, Utah; 4,500–9,000 feet altitude; May–July. (47.)

## NYMPHÆACEÆ.

Nuphar advena, Ait. Georgia to Western Texas and California, northward to latitude 56°. Met with only in alpine lakes of the Uinta Mountains: 10,000 feet altitude; August; in no way differing from ordinary eastern specimens. (48.)

## PAPAVERACEÆ.

Argemone Mexicana, L., Var. hispida, Torr. Leaves sinuately pinnatifid; stem and leaves armed with rigid reflexed prickles; pod also very spiny.—Stout, 2–3° high; flowers large, 2–4′ in diameter, white. This is *A. hispida*, Gray, and *A. munita*, Dur. & Hilg., and has been also considered the same as the Mexican var. *albiflorum*, Horn. From Arkansas and Kansas to Sonora and Nevada. Growing on dry foot-hills in Nevada, and in Salt Lake Valley, Utah; 4,500–6,000 feet altitude; June, July. (49.)

Eschscholtzia[1] Californica, Cham. Stem branching, leafy; torus tubular or funnel-form, more or less dilated.—1–2° high; variable in the size and color of the flowers, and in the extent of the torus-limb. California and Oregon. Rather rare in Western Nevada, and found only in fruit; collected also by Mr. Stretch near Washoe City. (50.)

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[1] ESCHSCHOLTZIA, Cham. Sepals coherent, deciduous, calyptralike. Petals 4, similar, inserted with the numerous stamens upon the throat of the more or less dilated torus. Ovary with 2 nerviform placentæ; style short; stigma divided into 4–6 linear divergent lobes. Capsule linear, 10-sulcate, dehiscent to the base; the rigid recurved valves placentiferous on the margin. Seeds not crested.—Annual glabrous and glaucous herbs, with linear-dissected leaves and yellow long-peduncled flowers. Benth & Hook.

Var. HYPECOIDES, Gray. Stems low and slender, 2–10′ high, flowers very small, 2–3″ in length. California and Western Arizona. Found on the dry foot-hills of the Virginia and Trinity Mountains, Western Nevada; 4,500 feet altitude; May. (51.)

CORYDALIS AUREA, Willd. Var. OCCIDENTALIS, Eng. Numerous specimens show the spur rather longer than usual in eastern plants, but the seeds are scarcely more acutely margined. The pods are either erect or reflexed, straight or curved, stout or slender, smooth or puberulent upon the sutures. Missouri to Texas, and westward. Found in the Wahsatch Mountains and on the rocky ridges bordering upon Salt Lake; 4,300–6,000 feet altitude; May–July. (52.

Var. MICRANTHA, Eng. Flowers small, nearly spurless, on short pedicels. Hitherto reported only from Western Illinois and Missouri. Bear River Cañon, in the Uinta Mountains, Utah; 9,000 feet altitude; August. (53.)

## CRUCIFERÆ.

PARRYA[1] MACROCARPA, Br. Glandular-pubescent; scape naked, 6′ high; leaves oblong-lanceolate, long-petioled, sinuately or incisely dentate; petals purple, broadly ovate, retuse; siliques broadly linear, (1½–2′ long and 3″ wide,) erect, somewhat constricted between the seeds; seeds in a single row, with broad membranous wings.—Agreeing with the figure and description (in Hooker's *Flora Bor.-Amer.*) of the Arctic plant, which has been hitherto found only on the Arctic coast, from the mouth of the Mackenzie to Behring Strait. Near the summit of one of the highest peaks of the Uintas, above Bear River Cañon, at an altitude of 12,000 feet. In flower and fruit; August. (54.)

CHEIRANTHUS[2] MENZIESII, Benth. & Hook. (*Hesperis*, Hook. *Phœnicaulis cheiranthoides*, Nutt.) Rootstock thick and woody; scapes (6–12′ high) nearly glabrous, with several sessile clasping leaves; leaves oblong-lanceolate, entire, attenuate at base into a long petiole, densely stellate-tomentose; flowers in a simple raceme, purple; sepals colored, short, obtuse, much shorter than the petals; siliques (1–2′ long and 2″ broad) spreading, flat, ensiform, acute, the valves opening elastically from the obtuse base.—Collected by Nuttall on the

[1] PARRYA, R. BROWN. Sepals erect. Petals spatulate, unguiculate. Anthers linear. Silique compressed with flat 1-nerved, often veined valves, and a hyaline septum; style rather short; lobes of the stigma connate. Seeds flat, orbicular, in 1–2 rows, broadly winged or marginless; cotyledons accumbent.—Low herbs, with thick perennial roots and numerous naked or leafy scapes and racemed flowers. BENTH. & HOOK.

[2] CHEIRANTHUS, L. Characters as in *Erysimum*, but with the seeds usually compressed, and the cotyledons accumbent, or very rarely incumbent. BENTH. & HOOK.

Columbia, and by Menzies and Brewer in California. Frequent on the mountain ranges of Western Nevada, at an elevation of 6–7,000 feet; April–June. (55.)

NASTURTIUM OFFICINALE, Br. In ditches and streams near Salt Lake City; doubtless introduced. (56.)

NASTURTIUM SINUATUM, Nutt. River banks, Missouri to Arkansas, Northern New Mexico and Arizona, and in Oregon. West Humboldt Mountains and Holmes' Creek Valley, Nevada; 5–6,000 feet altitude; September. (57.)

NASTURTIUM LYRATUM, Nutt. Erect, diffusely branched, glabrous, 6–10′ high; leaves lyrate-pinnatifid or lyrate, the segments oblong-lanceolate or oblong, incisely serrate, angularly toothed or entire; racemes panicled, with small flowers; siliques linear, compressed, more than twice longer than the pedicel, somewhat spreading, abrupt at the apex; style very short.—The pods in these specimens are nearly terete, 3–6″ long, on short (1–2″) pedicels. It is occasionally nearly prostrate, and seems to approach the following species. Truckee and Goose Creek Valleys, Nevada; 4,200–5,000 feet altitude; July–September. Found by Nuttall on the banks of the Columbia. (58.)

NASTURTIUM OBTUSUM, Nutt. Nearly the ordinary form, with oval or ovate-lanceolate pods, 2–3″ in length. The leaves are variable in the lobing and serratures, the lateral leaflets in some specimens being nearly obsolete; racemes much elongated in fruit. Banks of the Mississippi and westward, New Mexico, Colorado, and California; Smoky Valley and in the East Humboldt Mountains, Nevada, and in the Wahsatch, Utah; 6–7,000 feet altitude; June–August. (59.)

Var. (?) ALPINUM. Dwarf; leaves oblong, entire or with a few teeth, or coarsely lyrate-pinnatifid; lobes oblong; pods mostly shorter than the pedicels. Uinta Mountains, Utah, at head of Bear River Cañon; 10–11,000 feet; August. (60.)

NASTURTUM PALUSTRE, DC. Glabrous; pods oblong, 4–6″ long; the rarer typical form. Truckee Valley, Nevada; July. (61.)

Var. HISPIDUM, Gray. The more frequent form. The species extends from Arctic America to Northern Mexico, Louisiana, and North Carolina. Found in the Goose Creek and Jordan Valleys, and in the Wahsatch Mountains, Utah; 4,500–6,000 feet altitude; May–September. (62.)

Var. With the oval pods of the last, but truncate and the style extremely

short; glabrous throughout; tall, 3° high; leaves lanceolate, acuminate. Humboldt Slough, Nevada. (63.)

Var. Erect, 6–18′ high, glabrous; leaves lyrate, the lateral segments for the most part obsolete, the terminal lobe ovate-oblong, obtuse, sinuately and obtusely dentate, or entire; pods oblong, (3″ long,) equaling or exceeding the pedicels. Wahsatch Mountains, Utah; 6–8,000 feet altitude. No. 482 of Geyer's collection is the same; nearly intermediate between *palustre* and *obtusum*. (64.)

Barbarea vulgaris, Br. Indigenous from Lake Superior north and westward, and on the Pacific Coast from Sitka to the Sacramento; collected by Bigelow in New Mexico. Not uncommon in the mountain cañons of Nevada and Utah; 6–8,000 feet altitude; June–August. (65.)

Var. gracilis, DC. This is merely a reduced sub-alpine form. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch; 9,000 feet altitude; June–September. (66.)

Arabis hirsuta, Scop. A low ordinary form; 1° in height; radical leaves always rosulate; stems slender, with a few distant oblong or ovate leaves, few, to many-flowered; pedicels more or less spreading. Wahsatch and Uinta Mountains, Utah; 6–7,000 feet altitude. (67.) Also another common form, much stouter and taller; strictly radical leaves often wanting, while the cauline ones are numerous and more or less appressed, approaching *A. perfoliata* in habit, from which only flowering specimens cannot always readily be distinguished. The species is found from Virginia north to the Arctic Circle, and west to the Pacific. It was collected by Fendler in New Mexico. On banks of mountain streams, Nevada and Utah, at an elevation of 5–6,500 feet; June–October. (68.)

Arabis platysperma, Gray. *Proc. Amer. Acad.* 6. 519. Low, ($\frac{1}{2}$–1° high,) from a woody base; leaves, with the stem, hoary with a stellate pubescence, spatulate, entire, the uppermost oblong, sessile, obtuse; raceme few-flowered; flowers pink; pods erect, straight, broadly linear, (1–$2\frac{1}{2}$′ long, $2\frac{1}{2}$″ broad,) acuminate, flattened; valves loosely reticulated; stigma sessile; seeds broadly winged.—In the Sierra Nevada, (Brewer,) at an elevation of 13,000 feet. Found in the East Humboldt Mountains, Nevada, at 8,000 feet altitude; September. (69.)

Arabis canescens, Nutt. (?) (*A. puberula*, Nutt.) Perennial, cæspitose, more or less hoary-pubescent, with stellate hairs; leaves entire, spatulate-

linear, crowded at the base; those of the stem scattered, sessile; silique linear, flat, nearly straight, pendulous, acute; stigma sessile; seed broadly winged. —The specimens differ from Nuttall's in the erect or spreading, not pendulous siliques, in the more narrowly margined and less flattened seeds, and in the rather broader leaves; but it seems best to refer them here, as the following variety with both ascending and pendulous pods, a widely winged seed, and much broader leaves, would indicate that the differences were within specific limits. The stems are less than 6′ high, numerous from a many-branched woody base; flowers few, pale purple; pod 1½′ long, about 1″ broad. East Humboldt Mountains, Nevada; 8–10,000 feet; July, August. (70.)

Var. LATIFOLIA. As described under the last. Clover Mountains, Nevada, and Uinta Mountains, Utah; 12,000 feet altitude. The Uinta specimen, but for the seeds in the young pod being strictly in one row, would be placed with the alpine *A. Drummondii* from the same locality. (71.)

ARABIS LONGIROSTRIS. Annual, glabrous, glaucous, diffusely branched; radical leaves ovate-spatulate, cauline ones linear-lanceolate, narrowing to the base, entire or sparingly toothed; calyx of the small loosely racemed reflexed flowers a little shorter than the corolla; siliques linear, short-pedicelled, reflexed, beaked with the long narrow style; seeds in one series, rather narrowly margined.—Stem 1–1½° high, much branched; branches virgate and somewhat naked; flowers 1½″ long, light pink, calyx purplish; pods 1½–2′ long, less than a line broad, the narrow beak ¼′ long. Growing in alkaline soil at the Steamboat Springs near Washoe City, about Humboldt Lake, Nevada, and on Stansbury Island, in Salt Lake; 4,500 feet altitude; May, June. PLATE I. Fig. 1. A plant of the natural size, but under the average of the species. Fig. 2. A flower; enlarged four diameters. Fig. 3. A pod; natural size. Fig. 4. A seed, showing the embryo; enlarged four diameters. (72.)

ARABIS PERFOLIATA, Lam. (*Turritis glabra*, L. *T. macrocarpa*, Nutt.) From the Northern States to the Arctic Circle, and west to the Pacific and Northern California; also collected by Fendler in New Mexico. Found in the West Humboldt Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; May, June. (73.)

ARABIS DRUMMONDII, Gray. A very variable species; stem either strict or slender and flexuous; glabrous, with a slight ciliation upon the petiole of the

radical leaves, or quite densely covered with a stellate pubescence; the seeds are either oblong, closely arranged in two strictly parallel rows, or loosely and irregularly scattered and nearly orbicular; pods erect and straight, or spreading and arcuate; biennial, or apparently sometimes perennial. From the St. Lawrence and the great lakes to the Rocky Mountains, Oregon and California. In the West Humboldt Mountains, Nevada, and in the Wahsatch; 6–7,000 feet altitude; June. (74.)

Var. ALPINA. A reduced subalpine and alpine form, with a few crowded purple or white flowers; glabrous or stellately pubescent. East Humboldt and Clover Mountains, Nevada, and in the Uintas; 8–10,000 feet altitude; July–September. Also collected by Lyall on the northwestern boundary, and by Brewer in California. (75.)

ARABIS RETROFRACTA, Grah. (*Turritis*, Hook., and *T. patula*, Grah.; *Streptanthus angustifolius* and *virgatus*, Nutt.) Erect, more or less canescently pubescent; leaves lanceolate, radical ones petioled, toothed or nearly entire, the cauline sagittate and partly clasping; flowers spreading or reflexed, light rose-color or nearly white; siliques linear, elongated, straight, or nearly so, more or less reflexed; seeds in two rows, margined.—A comparison of numerous specimens can leave no doubt of the propriety of uniting *A. patula* with *A. retrofracta*. Both are referred by Dr. Hooker to *A. mollis*. The flowers are uniformly light-colored and the pubescence stellate, though the lower stems are occasionally hirsute. A single specimen has even the siliques pubescent. The leaves vary from all entire to all coarsely dentate, sagittate-amplexicaul or simply clasping, broad-lanceolate or almost linear; stems one or several, simple or branched. *Sisymbrium reflexum*, Kell., (*Proc. Cal. Acad.* 2.101, fig. 29,) is doubtless the same. From Canada to Colorado and California, northward to the Arctic Circle and Greenland. Frequent in Nevada and Utah, in the former especially; 4,500–8,000 feet altitude; April–July. (76.)

ARABIS ARCUATA, Gray. (*Streptanthus*, Nutt.) "Hirsutely villous, with branching hairs; leaves lanceolate-linear, remotely serrulate, the cauline sagittate and clasping, very acute; siliques flat and curved downward; petals (purple) obovate, exserted."—Very closely resembling the last, from which it is distinguished by its rather larger deep-purple flowers, which are usually suberect, by the rather more villous pubescence, and by the more arcuate siliques. It may prove to be but a variety. Upper California. On the foot-hills of the

Washoe, Trinity, and Toyabe Mountains, Nevada, often growing with the last; 4,500–6,000 feet altitude; April–July. (77.)

STREPTANTHUS[1] CORDATUS, Nutt. Glabrous; lower leaves spatulate-ovate or oblong, repandly denticulate, (chiefly at the apex;) cauline ones cordate, clasping, all obtuse; flowers on short pedicels; petals without a dilated lamina, scarcely exceeding the sepals; siliques erect or spreading, compressed, broadly linear; seeds flat, margined.—A glaucous perennial, ½–2° high; leaves thick, very obtuse or even truncate, with usually a few teeth at the summit; petals rarely half longer than the calyx, greenish yellow, or often deep purple; pods 3–4′ long, 1½–2″ wide. Nuttall describes the siliques as deflexed. They are most usually ascending, though specimens show them in some measure reflected. It has been collected by Newberry on the Lower Colorado; by Parry, in the Middle Park; and by Brewer, at Carson's Pass, in the Sierras. Found in the East Humboldt Mountains, Nevada, and not rare in the Uintas, on rocky ridges, at an elevation of 7–9,000 feet; July–August. (78.)

CARDAMINE CORDIFOLIA, Gray. *Pl. Fendl.*, *p.* 8. Stem erect, simple, from a fibrous creeping root, glabrous, or pilose at base, leafy; leaves petioled, cordate, sparingly repand-dentate or angular-toothed, ciliate, the lower orbicular or reniform, the upper triangular-cordate, subacuminate; flowers rather large, white; siliques suberect, 2–3 times longer than the spreading pedicels.—Stem 1–3° high; leaves 1–4′ in diameter. Discovered by Fendler in the Santa Fé Mountains, New Mexico, and collected since in Colorado, and by Lyall on the northwestern boundary. Found in the Clover Mountains,

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[1] STREPTANTHUS, NUTT. Characters nearly as in *Arabis;* the calyx large, with broad and colored sepals; anthers elongated and sagittate, with the longer filaments sometimes adnate; petals with long channeled somewhat twisted claws, with or without a dilated lamina; silique compressed, with 1-nerved valves, and flattened seeds in one series; stigma simple.

The limits of this genus have not been in fact strictly drawn, several of the recognized species deviating in a perplexing manner from the typical forms in their more or less terete pods and scarcely flattened immarginate seeds. It is found, however, on investigation, that in all of these cases the cotyledons are, to some greater or less extent, incumbent, showing that their true place is rather with *Thelypodium*. If *Streptanthus*, therefore, be restricted to such species only as have compressed pods, the valves sometimes slightly carinate, but the seeds always flattened, circular or elliptical, more or less margined, and with the cotyledons truly accumbent, the excluded species will be *S. crassicaulis*, Torr., *S. procerus*, Brewer, *S. Coulteri*, Gray, *S. longifolius*, Benth., *S. sagittatus*, Nutt., and *S. flavescens*, Torr. (not of Hook.) Of these the three latter are received without difficulty into *Thelypodium*, to which *Iodanthus pinnatifidus* may also be united, having the base of the radicle decidedly oblique. The remainder, with two other new species, form a group so well distinguished by their elongated terete pods, oblong seeds, and streptanthoid flowers with elaminate petals, that it seems advisable to form of them a new genus. (See *Caulanthus*, p. 27.)

Nevada, (rare,) and in the Wahsatch and Uintas; 7,000 feet altitude; June–September. (79.)

CARDAMINE HIRSUTA, L. The Atlantic States to Florida, and from Canada to Colorado and Northern California, northward to the Arctic Sea. In the Wahsatch and Uinta Mountains, Utah, and in Goose Creek Valley, North-eastern Nevada; 6–7,000 feet altitude; June–September. (80.)

PLATYSPERMUM[1] SCAPIGERUM, Hook. Annual, low, (2–3′ high,) glabrous; leaves radical, runcinate-pinnatifid; scapes numerous, 1-flowered; petals white.—Collected by Douglas and Geyer on the Columbia River. Now found at the Steamboat Springs, near Washoe City, Nevada. In fruit; May. (81.)

VESICARIA MONTANA, Gray. *Proc. Acad. Phil., March*, 1863, *p.* 58. Hoary, with a silvery pubescence; root perennial; stems diffuse, decumbent, leafy; leaves spatulate, radical ones subovate, petioled, sometimes with 1–2 teeth; raceme elongated in fruit; pod oval or oblong, pubescent, longer than the slender style, and a little longer than the spreading curved pedicel.—Seeds 2–6 in each cell, wingless; petals spatulate, light yellow; filaments filiform. Subalpine; found by Hall & Harbour in Colorado; not rare in the East and West Humboldt Mountains, Nevada, and in the Wahsatch; 9–10,000 feet altitude; June–August. (82.)

PHYSARIA[2] DIDYMOCARPA, Gray. (*Vesicaria*, Hook.) Radical leaves broadly obovate-spatulate, occasionally lyrate; cauline lanceolate-spatulate, mostly entire; siliques large, globose-didymous, deeply emarginate above and below.—A low decumbent profusely branched perennial; the showy oblong-spatulate petals exceeding the oblong sepals; silicles varying in size, (2–6″ in diameter,) the lobes usually approximate, sometimes considerably divergent; the septum ½–1½″ long. From Colorado to Oregon and north to lat. 57°. In the East and West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6,500–9,000 feet altitude; June, July. (83.)

DRABA ALPINA, L. Somewhat rigid; scapes naked, mostly somewhat hirsute; leaves spatulate-lanceolate, plane, more or less pilose with branching hairs; petals (yellow) more than twice the length of the calyx; silicles somewhat corymbed, oblong-elliptical; style very short.—North Greenland and

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[1] PLATYSPERMUM, HOOK. Sepals equal, spreading. Petals obovate, subsessile. Pods orbicular, much compressed, with a hyaline septum; valves flat; stigma sessile, simple. Seeds few, orbicular, with a broad margin and slender seedstalk; cotyledons accumbent.—A low annual. BENTH. & HOOK.

[2] PHYSARIA, NUTT. Characters as in *Vesicaria*, (to which it is referred by Benth. & Hook.,) but the silicle didymous, much inflated, membranous; the cotyledons contrary to the narrow septum.

the Arctic Coast to Behring Strait; also collected by Parry in Colorado, and by Brewer in the Sierra Nevada. Numerous specimens were collected in Nevada and Utah, varying much, but belonging to one species. Those distributed under this number are 3–4′ high, with the large flowers and fruit in a loose raceme; leaves spatulate or obovate, nearly veinless, stellately pubescent; scape nearly glabrous; pods* glabrous or pubescent. East Humboldt Mountains, Nevada; 8–9,000 feet altitude; July. (84.)

Var. Somewhat more densely matted, and crowded with the leaves of previous seasons; 2–4′ high; leaves linear-lanceolate, with a more or less prominent mid-vein; pubescence occasionally wanting. East Humboldt Mountains, Nevada; 8–10,000 feet altitude; July, August. (85.)

Var. (=*D. glacialis*, Adams.) A dwarf and more alpine form, still more compact, and the scapes but an inch high, 1–several-flowered; leaves densely crowded, more rigid and strongly midveined, densely pubescent or nearly glabrous, not ciliate. Lyall collected similar specimens on the northwestern boundary, and Brewer in California. Clover Mountains, Nevada, and the Uintas; 10–12,000 feet altitude; August, September. (86.)

Var. (near *D. glacialis*, Var. *γ*, Hook.) Very dwarf and matted; scapes, pedicels, and silicles hirsute-pubescent, while the rigid linear keeled leaves are strongly ciliate, but otherwise glabrous. Similar to 2716 Brewer. East Humboldt Mountains, Nevada; 10,000 feet altitude; August. (87.)

Var. (=*D. algida*, Adams.) Dwarf and matted; scape very short, 1–3-flowered, and with the silicles glabrous; leaves ovate, glabrous, ciliate, less rigid, and scarcely nerved. Resembles specimens of Bongard from Altai, and of Hooker and Thompson from Tibet. East Humboldt Mountains, Nevada, and Uinta Mountains, Utah; 10–12,000 feet altitude. August. (88.)

Draba stellata, Jacq. Perennial; scape with a single leaf, pubescent; leaves oblong-oval, tomentose with a short stellate pubescence; pedicels puberulent; silicles oblong. Var. hebecarpa; with the silicles pubescent. Scape mostly leafless; lower leaves lanceolate-obovate; flowers white. A reduced (1–2′ high) and rather unsatisfactory form. Arctic America. East Humboldt and Uinta Mountains; 9–11,000 feet; July, August. (89.)

Draba muricella, Wahl. (?) Scape naked, velvety; leaves oblong, entire, canescent, with a soft stellate pubescence; silicles oblong-lanceolate, glabrous; flowers white.—Labrador and Arctic America. Considered by Hooker distinct from the last. The specimens vary considerably from the

description and from each other, and may be distinct, some or all of them. Some, however, agree well with Lapland specimens of *D. nivalis*, Lilj., (referred to this species,) from Anderson, in Herb. Gray. All have glabrous naked scapes and silicles, with small obovate pubescent leaves; otherwise they may be thus divided: (*a*) with very slender 1–3-flowered scapes, 2′ long; flowers small, petals half longer than the calyx; silicle linear-oblong, (3–4″ long,) with a short style; (*b*) with shorter scape, and style none; (*c*) with ovate silicles, acuminate with a longer (⅛″) style. (*a*) and (*b*) are from the same locality in the Uinta Mountains; 12,000 feet altitude; August; (*c*) from the East Humboldt Mountains, Nevada; 10,000 feet altitude; September. (90.)

DRABA DOUGLASII, Gray. *Proc. Amer. Acad.* 7. 328. Caudex with numerous short stems; scapes naked, corymbosely many-flowered; leaves all rosulate, subcartilaginous, nearly veinless, entire, glabrous or somewhat hirsute (as also the scape) with simple hairs, hispidly ciliate, the lowest ovate, the upper ones obovate or spatulate; flowers rather large, white, with oval glabrous sepals; silicles ovate, puberulent, beaked with the slender style; cells 2-ovuled near the summit.—A low cæspitose perennial; scapes an inch in height. Collected by Douglas in Northern California or Oregon, and by Anderson in the Sierras south of Carson City. Mount Davidson, Nevada; 6,000 feet altitude; April, in flower only. (91.)

DRABA AUREA, Vahl. Pubescent; stem erect, leafy; leaves lanceolate or ovate-lanceolate, acute, entire or toothed; corymbs terminal and axillary; silicles oblong-lanceolate, pubescent, exceeding the pedicels; petals (yellow, or sometimes white) emarginate; style rather short.—Biennial or perennial; stems few in young plants, becoming many. The specimens have simple racemes, resembling those collected in Colorado and by Bourgeau. Found in the Rocky Mountains, from New Mexico to British America. Uinta Mountains, Utah; 8–11,000 feet altitude; August. (92.)

DRABA NEMOROSA, L. In the Rocky Mountains, from Colorado to the Arctic Circle and the northwest coast. Frequent in the Wahsatch Mountains, Utah; 4,500–8,500 feet altitude; May–July. (93.)

Var. LUTEA, Gray. (*D. lutea*, DC.) Often with the stem nearly or quite leafless, and the petals sometimes pinkish-white; the sepals are sparsely hirsute; the pedicels scarcely exceed or are even shorter than the silicles. Similar specimens collected in Colorado have been considered *D. crassifolia*, Grah., but it is evidently a form of the last—more alpine. In the East Hum-

boldt, Wahsatch, and Uinta Mountains; 9–10,000 feet altitude; July, August. (94.)

Draba Caroliniana, Walt., Var. micrantha, Gray. From Rhode Island to the Missouri, and southward to Georgia. The variety is the more western form, being reported from Missouri and Arkansas, New Mexico, and Sonora. Found in Salt Lake Valley, and on Antelope Island in Salt Lake. May, June. (95.)

Sisymbrium junceum, Bieb. Glabrous, glaucous, stems several from a perennial root, 8–15′ high; lower leaves petioled, runcinately pinnatifid, the upper ones linear-lanceolate, entire; flowers yellow, 2–3″ long; style very short; siliques terete, very slender, 2′ long, sub-erect; pedicels spreading.—Collected by Douglas and Wyeth on the Columbia and Salmon Rivers, Oregon. East Humboldt Mountains, Nevada; 8,000 feet altitude; August. (96.)

Sisymbrium canescens, Nutt. Varying much in the section of the leaves and in the degree of pubescence—the latter always branched; 3′–2° high. From Arctic America to Mexico. Very abundant on the dry foothills and valleys of Nevada. Known as "Ah-tsàh" by the Pah-Utes, who gather its seed for food. 4,500–5,000 feet altitude; April–September. (97.)

A form occurs with the siliques oval or long-elliptical, 1½–3″ long, one-half to one-third the usual length. Near Humboldt Lake, Nevada. (98.)

Sisymbrium Californicum. (*Smelowskia ?*, Gray. *Proc. Amer. Acad.* 6. 520.) Annual, branching above, hoary-pubescent, or the stem sub-glabrous; leaves pinnately parted, segments usually obtuse, 3–5-lobed; flowers small, yellow; pods small, oblong or linear, more or less acute at each end, apiculate with the short style; cells 1–12-seeded; seeds in one series.—Stems 1–3° high, less diffusely branched than *S. canescens*, which it closely resembles, but from which it is at once distinguished by its 1-seried seeds; the pods are also often (but not uniformly) narrower and more acuminate, and it is found at higher elevations. The plant upon which the species was founded had unusually few-seeded pods; with a fuller set of specimens there could have been little hesitation in referring it to *Sisymbrium*. Found by Brewer on Mount Dana and near Mono Lake, California. Frequent on the Toyabe and East Humboldt Mountains, Nevada, and in the Wahsatch; 6–10,000 feet altitude; June–August. (99.)

SMELOWSKIA[1] CALYCINA, Mey. (*Hutchinsia*, Desv.) Leaves mostly radical; flowers white, in dense corymbs, the limb of the petal roundish; stem (6′ high) elongating in fruit.—Rocky Mountains, from Colorado to lat. 57°, and Behring Strait. East Humboldt Mountains, Nevada, and in the Uintas; 10–11,000 feet altitude; August, September. (100.)

ERYSIMUM CHEIRANTHOIDES, L. From Pennsylvania to Colorado, the Arctic Circle and Washington Territory. Reese Valley, Nevada, and in the Wahsatch and Uinta Mountains; 5–6,500 feet altitude; June, July. (101.)

ERYSIMUM ASPERUM, DC. From Missouri to Western Texas and Southern California, and northward to lat. 57°. Frequent in the mountains of Nevada and Utah; the stem simple and leaves nearly entire; 5–12,500 feet altitude; May–August. (102.)

Var. PUMILUM. An early spring form from the foothills near Carson City, Nevada; branching from the base and leaves more dentate. It does not appear to differ from *E. pumilum*, Nutt., and may be distinct. April. (103.)

Var. INCONSPICUUM. With small flowers, the petals but half longer than the (3–4″ long) sepals. Collected also by Bourgeau. Diamond Valley, Nevada. (104.)

STANLEYA[2] PINNATIFIDA, Nutt. Stems 2–3° high, decumbent at base, several from the same rootstock; lower leaves lyrate-pinnatifid, lobes somewhat lanceolate; upper leaves entire, lanceolate, narrowed at base to a slender petiole; filaments much elongated; siliques 2′ long, somewhat torulose, twice longer than the stipe.—The leaves are often nearly all entire, forming in the absence of the lower ones the *S. integrifolia*, James, which cannot rank even as a variety. *S. fruticosa* and *heterophylla*, Nutt., are probably also included. The woody base is sometimes an inch or more in diameter, showing 10–12 annual rings. From Western Iowa to the headwaters of the Platte and Snake Rivers, southward to Northern Arizona and New Mexico. Valleys of Nevada and foothills of the Wahsatch; 4,500–5,000 feet altitude; June, July. (105.)

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[1] SMELOWSKIA, C. A. MEYER. Sepals short, equal. Silicle rather short, narrowed at each end, somewhat tetragonal or laterally compressed; valves concave, submembranous, with included filiform replum and membranous septum; style short and stigma simple. Seeds few, in one row, immarginate; funiculus setaceous, free; cotyledons incumbent.—Perennial hoary-tomentose subcæspitose herbs, with 1–2-pinnatifid leaves and bractless flowers. BENTH. & HOOK.

[2] STANLEYA, NUTT. Sepals long, spreading. Petals narrow, elongated, with long claws. Anthers twisted. Siliques long-stipitate, slender, nearly terete, subcompressed; valves 1-nerved; style short or none; stigma simple. Seeds in one row, oblong, pendulous; cotyledons incumbent.—Perennial, glabrous, glaucous; flowers yellow, in long, strict, many-flowered, bractless racemes. BENTH. & HOOK.

STANLEYA VIRIDIFLORA, Nutt. Erect, glabrous; radical leaves obovate or lanceolate, petioled, entire or with a few runcinate teeth toward the base; the cauline lanceolate, acute, sessile, clasping; calyx and petals greenish-yellow; silique elongated, torulose.—Stem simple, 2–4° high; leaves rapidly diminishing in size upward; fruiting raceme 2° or more long; siliques very narrow, 2–3′ long, on ½′ stipes. Collected by Nuttall on Ham's Fork of the Greene River and on the headwaters of the Snake. 97 Geyer appears to be the same. Found in Regan's Valley, Nevada, and on the Bear River, Utah; 5–6,000 feet altitude; July, August. (106.)

THELYPODIUM[1] INTEGRIFOLIUM, Endl. (*Pachypodium*, Nutt.) Leaves entire, radical ones petioled, oblong-elliptical, the cauline lanceolate, sessile, the uppermost nearly linear; stem fastigiately branched; flowers almost corymbose, crowded; petals spatulate-obovate; silique short, subtorulose, acuminate, very shortly stipitate.—Tall, 3–6° high; flowers pale rose-color; fruiting racemes short, crowded; siliques 1′ long. Northwestern New Mexico, Colorado, and Wyoming, westward to Northern California and Oregon. Found in the Truckee Valley, Nevada, in Southeastern Idaho, at City of Rocks, and in the Wahsatch; 4,500–6,000 feet altitude; July–September. (107.)

THELYPODIUM SAGITTATUM, Endl. (*Pachypodium*, Nutt.) Leaves

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[1] THELYPODIUM, ENDL. (See note to *Streptanthus*, on page 19.) Sepals elongated, equal at base, often colored. Petals long, linear, or with a plane lamina, unguiculate. Anthers linear. Silique sessile or with a very short thick stipe, linear, subterete or somewhat compressed, torulose, not greatly elongated; valves convex, subcarinately 1-nerved; style rather short; stigma nearly entire. Seeds in one row, oblong, somewhat compressed, immarginate or scarcely margined; cotyledons more or less incumbent.—Annual or perennial, with spicately racemed bractless white or rose-colored flowers; silique 1–2½′ long. The genus includes the following species:

* Leaves entire.

T. INTEGRIFOLIUM, Endl. (See above.)

T. LINEARIFOLIUM, Gray. (*Streptanthus*, Gray. *Plant. Fendl, p.* 7.) Leaves linear, the lowermost lanceolate, narrowed at base; flower showy. New Mexico.

T. SAGITTATUM, Endl. See above.

T. NUTTALLII. See p. 26.

** Radical leaves, at least, toothed or pinnatifid.

T. BRACHYCARPUM, Torr. See p. 26.

T. LACINIATUM, Endl. See p. 26.

T. LONGIFOLIUM. (*Streptanthus*, Benth., *Plant. Hartw., p.* 10, and probably *S. micranthus*, Gray, *Plant. Fendl. p.* 7.) Lower leaves rough-hirsute; pod sub-pendulous. New Mexico.

T. PINNATIFIDUM. (*Iodanthus hesperidoides*, Torr. & Gr.) Glabrous, leaves all toothed, lowermost lyrate-pinnatifid; racemes loose, panicled. From the Alleghanies to Illinois and Arkansas.

T. FLAVESCENS. (*Streptanthus*, Torr., *Pac. R. R. Surv.* 4. 65; not of Hooker.) Pilose; upper leaves sessile and entire; pods hirsute, erect.—Whipple's plant in Herb. Torr. has a nearly terete pod, with oblong flattened seeds, the radicle oblique at base. Dr. Gray, in his MSS. notes upon Douglas's plant in *Herb. Kew.*, but for its leaves not auriculate at base, would consider it a depauperate, small-flowered form of *S. heterophyllus*, Nutt., which, however, has flattened pods and small flat orbicular slightly margined seeds and is a true *Streptanthus*. California.

entire, lanceolate; the cauline ones sagittate, clasping; flowers in crowded racemes; petals obovate, the claw exceeding the sepals, nearly white; raceme elongated in fruit; siliques spreading, subterete, more or less torulose, acuminate with the rather long style; seeds emarginate, cotyledons often nearly incumbent.—Rarely erect, loosely branched, the branches usually weak and flexuose; leaves somewhat glaucous, radical ones 3–4′ long, on slender petioles; sepals green or colored; petals pale-pink or white; siliques 1–2′ long. Growing under bushes in the alkaline valleys of Nevada, and in Salt Lake Valley, Utah. May–July. (108.)

THELYPODIUM NUTTALLII. (*Streptanthus sagittatus*, Nutt.) Leaves entire, the radical ovate, petioled, the cauline ones lanceolate, sagittate, clasping; flowers loosely racemed; petals ovate-oblong, the claw exceeding the sepals, purple; siliques spreading, subterete, more or less torulose, acuminate with the rather long style; seeds emarginate, cotyledons nearly accumbent.—Very near to the last and growing in similar localities, but usually stouter and more erect, 3–5° high; radical leaves often 6–8′ long, and half as broad; petals and calyx bright purple, or rarely nearly white; siliques 1–2′ long; cotyledons nearly accumbent, and the seeds, therefore, rather flatter than is usual in the last. Collected by Nuttall in Southern Idaho, and since by Ives in Arizona. (109.)

THELYPODIUM BRACHYCARPUM, Torr. *Proc. Amer. Acad.* 6. 520. Stem virgate; cauline leaves rather numerous, oblong-lanceolate, sagittate, entire, erect; raceme elongated, very narrow, spiciform; pedicels shorter than the calyx; sepals linear; petals very narrowly linear; anthers mucronate; siliques ½–1′ long, the valves carinately 1-nerved.—The radical leaves, often wanting, are runcinate-pinnatifid, or sometimes nearly entire; the cauline occasionally sparingly toothed, appressed to the stem or spreading; the stem often tall and stout, (1–5°,) and with much the habit of *T. integrifolium*, with which it was found in the Truckee Valley. Collected by the Wilkes Exploring Expedition in California and by Brewer at Mono Lake. (110.)

THELYPODIUM LACINIATUM, Endl. (*Pachypodium*, Nutt.) Glabrous; leaves oblong-lanceolote, all petioled, sinuate-dentate, or laciniately pinnatifid, or coarsely and unequally toothed; flowers on spreading pedicels; petals linear, three times as long as the calyx; stipe very short; siliques subterete, acuminate.—Stem erect, 2–5° high, simple or branched; leaves very variable, on slender petioles; racemes virgate, elongated; flowers nearly white; siliques

1½–2½′ long. Collected by Douglas and Nuttall on the Columbia River, and by Bloomer near Virginia City, Nevada. Found on the Mount Tobin range, Nevada, and in the adjacent Regan's Valley; 5–6,000 feet altitude; June. (111.)

CAULANTHUS[1] CRASSICAULIS. (*Streptanthus*, Torr. *Stansbury's Rep.*, *p.* 384, *t.* 1.) Glaucous; stem glabrous, fistular, inflated; leaves oblong, runcinate or runcinate-pinnatifid, with long petioles; flowers ascending, the dark-purple petals linear, rather obtuse, scarcely a half longer than the very woolly calyx; siliques elongated, linear, terete; seeds subcompressed, irregularly angular; cotyledons very obliquely incumbent.—Stem erect, simple or rarely branched, 2–3° high; leaves mostly radical, the terminal lobes largest and triangular or deltoid; sepals oblong, 6″ long; petals slightly dilated above the short claw; pods on very short pedicels, ascending, 3–5′ long and 1½″ broad, cylindrical, terminated by the conspicuous stigma-lobes. On dry foot-hills of Nevad and Utah; known as "Wild Cabbage," and sometimes used as a barely tolerable substitute for the cultivated plant. This fancied affinity to the cauliflower-tribe of more favored regions has suggested the generic name. In flower and fruit, May–July. (112.)

CAULANTHUS PILOSUS. Biennial, pilosely hispid, branched; leaves petioled, lyrate-pinnatifid, lobes sparsely angular-toothed; racemes loosely flowered; flowers greenish-white, spreading; petals a little exceeding the sepals, oblong, contracted above; siliques linear, elongated, subterete; style none, or a mere contraction between the ovary and the somewhat lobed stigma; seeds oblong, flattened.—A coarse, unsightly plant, 3–4° high, the

[1] CAULANTHUS. (See note to *Streptanthus*, on p. 19.) Sepals large, nearly equally saccate at base. Petals but little longer than the sepals, undulate-crisped, the lamina only a somewhat dilated rhomboidal extension of the broad claw. Anthers linear. Siliques sessile or with a short and thick stipe, terete, elongated; valves convex, more or less distinctly 1-nerved; stipe short or none; stigma 2-lobed, or slightly emarginate. Seeds in one row, oblong, flattened, immarginate or scarcely margined; cotyledons more or less incumbent.—Stout biennial or perennial herbs; leaves mostly pinnatifid; flowers in long loose racemes; pods 3–5′ long.

Though technically to be classed with the *Sisymbriæ*, yet, like *Thelypodium*, the genus is so closely related to *Arabis* and *Streptanthus* that some less artificial arrangement, that would bring them nearer together, is desirable. We refer to it the following additional species:

C. PROCERUS. (*Streptanthus*, Brew. *Proc. Amer. Acad.* 6. 519.) Biennial, stout, glabrous and glaucous, 4–6° high; leaves petioled, coarsely laciniate-pinnatifid; flowers greenish-white, 6″ long; pod 4′ long, terete, acuminate with the nearly entire style; cotyledons decidedly incumbent, shorter than the radicle. California.

C. COULTERI. (*Streptanthus*, Gray MSS. *S. heterophyllus*, Gray, *Proc. Amer. Acad.* 6. 185, in part, not of Nuttall.) Cauline leaves cordate lanceolate, entire or rarely dentate, hispid; pedicels hispid, spreading; sepals oblong-lanceolate, 4″ long, often hirsute at base; pods deflexed, the valves nerved; stigma strongly 2-lobed. S. California.

lower stem and leaves pilose with scattered hairs, more or less glabrous above; calyx slightly pilose, 4″ long; immature siliques 3–4′ long, ½″ wide. Very near *C. procerus*, but readily distinguished by its obtuse siliques. On dry foot-hills in the Truckee Valley, and near Humboldt Lake, Nevada; May. (113.)

CAULANTHUS HASTATUS. Perennial, glabrous, simple or somewhat branched; leaves petioled, very variable; radical ones lyrate or entire, the terminal leaflet ovate, acute, hastate, or truncate at base; cauline leaves ovate-oblong, entire, hastate, rounded or cuneate at base; flowers greenish-yellow, in a loose virgate raceme, reflexed; sepals narrow-lanceolate, distant; petals (sometimes nearly wanting) equaling the sepals, sublaciniately toothed laterally; siliques linear, subterete, obtuse, spreading; seeds flattened, slightly margined or immarginate; cotyledons nearly accumbent.—A stout, somewhat glaucous plant, 3–5° high, with large heteromorphous, but often hastate leaves, which when lyrate have the few small lateral leaflets distinct along the narrow rachis. On shaded slopes in the Wahsatch and Uinta Mountains; 6–7,000 feet altitude; June–August. PLATE III. Fig. 1. A flowering plant, one-half the natural size. Fig. 2. A flower. Fig. 3. A petal; both enlarged four diameters. Fig. 4. A pod, of natural size but shorter than the average. Fig. 5 and 6. A seed, in position, and its embryo; enlarged four diameters. (114.)

BRASSICA (SINAPIS) NIGRA, Benth. & Hook. Near a deserted "city" in the West Humboldt Mountains; doubtless introduced. (115.)

BRASSICA (SINAPIS) CAMPESTRIS, L. Found growing among sage-brush in several localities in Nevada, but at no great distance from the Overland Stage-road, and doubtless introduced. (116.)

CAPSELLA BURSA-PASTORIS, Mœnch. Frequent among sage-brush near Camp Douglas, Utah. Introduced. (117.)

CAPSELLA DIVARICATA, Walpers. (*Hymenolobus*, Nutt.) Erect or sub-decumbent, branched; leaves ovate and entire, or pinnatifid with several oblong lobes; upper leaves linear and often entire; silicle elliptic-oblong, obtuse.—A small slender-branching glabrous annual, 2–6′ high. In numerous specimens from half-a-dozen localities, it is rarely that a pinnatifid leaf is found; the radical leaves are more usually ovate, on petioles equaling or exceeding the blade; occasionally sinuate dentate or pinnately lobed. Collected by Nuttall on the Columbia, by Parry in Southern California, and by Anderson near Carson

City, Nevada. Frequent in sub-alkaline soils under sage-brush in Carson and Humboldt Valleys, Nevada, and Salt Lake Valley, Utah. April–June. (118.)

Lepidium intermedium, Gray. Western specimens of this species are most usually apetalous, and either glabrous or pubescent. Dr. Hooker appears to consider it the same with *L. ruderale*, L., Tibetian specimens of which, in Herb. Gray., are identical in shape and size of the pod with some of the Western American ones. The petaled form is reported from the Indian Territory, Western Texas, New Mexico, and Utah. The apetalous form has a wider range, from Hudson's Bay and the Arctic Circle to the Pacific, south to Illinois, and much more rarely along the central ranges into New Mexico. Found frequently in the valleys and on the foot-hills of Nevada and of Salt Lake Valley; 4,500–6,500 feet altitude; May–July. (119.)

Lepidium alyssoides, Gray. *Pl., Fendl., p.* 10. Glabrous; stems diffuse from a perennial root; leaves narrowly linear, acute, narrowed at base, entire, sometimes pinnately 3–5-lobed; racemes densely corymbed; petals round-spatulate, thrice longer than the calyx; stamens 6; pods ovate, wingless, scarcely emarginate, glabrous; style very short.—6–12′ high; flowers conspicuous; siliques 1″ in length, with a minute emargination; secondary leaves sometimes bi-pinnatifid. Western Texas to Arizona. Foot-hills of the Trinity Mountains near Humboldt Sink, and of the West Humboldt Mountains, Nevada; in flower; May, June. (120.)

Lepidium montanum, Nutt. Biennial, erect or decumbent, diffusely branched; leaves pinnatifid, segments more or less dissected, especially upon the upper margin; uppermost leaves with fewer segments, trifid or entire; flowers in dense corymbed racemes; petals round-spatulate, twice longer than the sepals; pods orbicular, slightly emarginate, wingless, or somewhat winged and ovate.—Glabrous, or hoary with a short grayish pubescence; variable also in the section of the leaves and in habit of growth; fruiting racemes rather short. Southern California and Sonora to the Columbia River. Frequent in the valleys of Nevada and Utah, growing in damp sub-alkaline soils; 4,500–6,000 feet altitude; May–September. (121.)

Var. alpinum. With decidedly perennial root-stock; glabrous; leaf-segments somewhat broader, and style longer. Chiefly remarkable for its habitat—a damp rocky gorge of Cottonwood Cañon in the Wahsatch, at an elevation of 9,000 feet; July, August. (122.)

Lepidium ——? Leafless specimens, long past maturity; 2° high, erect,

branched above, the branches terminating in corymbs of 3–6 short racemes, 1′ long; pods very small, $\frac{3}{4}''$ in length, ovate, somewhat winged above, scarcely twice longer than the style; branchlets hispidly pubescent. Pah-Ute Range, Nevada; 5,000 feet altitude; October. (123.)

Lepidium Fremontii. Perennial, erect, diffusely branching, suffrutescent at base, glabrous, glaucous; leaves entire or rarely sparingly lobed, linear, obtuse, narrowed at base, somewhat fasicled; racemes few-flowered; petals ovate-spatulate, twice exceeding the sepals; stamens 4; pods large, orbicular, wingless, very slightly emarginate; style short; cotyledons incumbent.—Much branched, 1° high; racemes less than 12-flowered. Gathered by Frémont on the Mohave River in 1844, and now collected on sandy foothills near the Humboldt Sink. The amount of material is still scanty, but sufficient to give the characters. Plate IV. Fig. 1. The extremity of a branch; natural size. Fig. 4. A flower; enlarged four diameters. (124.)

Lepidium dictyotum, Gray. *Proc. Amer. Acad.* 7. 329. Annual, 2–3′ high; puberulent throughout; leaves narrowly linear, entire or pinnatifid with linear lobes; petals small, oblong, a little exceeding the calyx, or wanting; stamens 4; pods finely reticulated, subovate, somewhat winged at the apex, deeply emarginate, longer than the thick flattened erect pedicel. Racemes strict, shorter than the leaves; siliques becoming nearly 2″ long. Near Carson City, Nevada, where it is common under sage-brush; April; collected in the same region by Mann and Anderson. In the specimens from which the original description was drawn, the flowers were apetalous and the leaves entire. Plate IV. Fig. 1. A plant; natural size. Fig. 2. A nearly mature pod, showing the calyx and petals; enlarged four diameters. (125.)

Lepidium flavum, Torr. *Pac. R. R. Surv.*, 4. 67. Annual, diffusely branched, decumbent, glabrous; leaves rather thick, oblong-spatulate, the radical ones pinnatifid with short rounded lobes, the cauline sparingly toothed or entire; flowers yellow, capitate; petals obovate, unguiculate; stamens 4; pods broadly ovate, reticulate, with a broad sinus between the short narrow wings; style slender, nearly equaling the pod; cotyledons incumbent.—Stems becoming 6′ in length, with numerous densely capitate racemes, pedicels reflexed in fruit. Collected by Frémont near Mohave Creek in Western Arizona. Frequent about Humboldt Lake, Nevada; May. (126.)

Lepidium nanum. Perennial, dwarf, matted-cæspitose, glabrous, excepting the pubescent pedicels; leaves crowded, small, ovate-spatulate,

PLATE

3-lobed at the apex, with a broad ciliated petiole; lobes rounded, obtuse; scapes scarcely exceeding the leaves, 1–5-flowered; flowers unknown; pods ovate, narrowly bidentate above, a line in length, thrice longer than the style; cotyledons accumbent.—Whole plant scarcely an inch high, in dense mats, the caudex branching into numerous heads, each terminated by a crowded cluster of small leaves. On a dry gravelly knoll at the head of Holmes Creek, Nevada; 6,000 feet altitude; September. PLATE IV. Fig. 5. A branch; natural size. Fig. 6. A branchlet; enlarged two diameters. Fig. 7. A leaf; enlarged four times. (127.)

THLASPI ALPESTRE, L (?) Perennial, glabrous; stems ascending, 3–12′ high, simple; radical leaves petioled, ovate or obovate, entire or denticulate, the cauline ovate or oblong, cordate-clasping; racemes crowded or usually elongated and loose, ½–6′ long; flowers rather large, the petals 1–3″ long; pods 2–4″ long, acutely margined but not winged, short-oblong, cuneate at base, emarginate, truncate, or rounded at the apex, 4–8-seeded; style ½–1″ long.—Usually referred to *T. cochleariforme*, DC., and including *T. Fendleri*, Gray, but the same as European and Tibetian specimens of *T. alpestre*, except in its usually larger flowers. In the Rocky Mountains, from the head-waters of the Columbia to New Mexico. Frequent in the East Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 8,500–11,000 feet altitude; July–September. (128.)

THYSANOCARPUS[1] ELEGANS, Fisch. & Mey. Leaves oblong-lanceolate, radical ones pinnatifid or repandly toothed, the cauline mostly entire and sagittate-clasping; silicles orbicular-obovate, plano-convex, broadly winged, obscurely crenate, the margin entire or perforated, not marked by elevated radiating veins.—Stem 1–2° high, branched above; quite variable in foliage, pubescence, and development of the wing. The species doubtless includes *T. curvipes*, Hook., and *T. pulchellus*, F. & M. *T. radians*, Benth., is clearly distinct, as also *T. laciniatus*, Nutt., (which probably should include *T. crenatus*,) and *T. pusillus*, Hook, (=*T. oblongifolius*, Nutt.) California and Arizona, north to the Columbia. Near Carson City and in the West Humboldt Mountains, Nevada; 5,000 feet altitude; April–June. (129.)

[1] THYSANOCARPUS, HOOK. Petals small. Pod ovate, obovate, or orbicular, much compressed, 1-celled, indehiscent, membranously winged; style filiform. Seed pendulous, wingless; cotyledons accumbent or obliquely incumbent.—Slender branched annuals; flowers small, racemed, on filiform pedicels, which are nodding in fruit. BENTH. & HOOK.

## CAPPARIDEÆ.

Cleome[1] integrifolia, T. & G. Leaves 3-foliolate; leaflets lanceolate or oblong, entire, sub-mucronate; sepals united below; petals light-purple, with short claws; pods oblong-linear, much exceeding the stipe.—Stem 2–3° high; flowers large and showy. From New Mexico to the Upper Missouri and Oregon. Frequent in Salt Lake Valley; June–September. (130.)

Cleome aurea, Nutt. Leaves 3–5-foliolate; leaflets oblong-lanceolate, (1–2′ long,) acute at each end, entire; sepals united at the base only; petals (3″ long) oblong-elliptical or ovate-oblong, nearly sessile; stamens equal; pods linear-oblong, (1′ long,) exceeding the stipe.—Stem 1–2° high, branched above, the branches terminating in a dense sub-capitate raceme of bright yellow flowers, elongating in fruit; filaments filiform, much exserted, anthers closely coiled. This is doubtless the plant of Douglas's collection, the *C. lutea*, Hook., in Flora Bor.-Americana, though it does not accord in all respects with the description and figure. From the head-waters of the Platte to the Columbia. Frequent in the dry valleys of Nevada, and collected by Palmer (1870) in Southern Utah; May–August. (131.)

Cleome ——— ? Small, (6′ high,) branched from the base; leaves 3-foliolate; leaflets (4–7″ long) oblanceolate; flowers in loose few-flowered racemes; sepals distinct; petals oblong, (5″ in length,) yellow; stamens unequal, scarcely exceeding the petals; pods linear-oblong.—Apparently distinct from the last, but the single early specimen is insufficient for a definite specific description. Found near Humboldt Lake, Nevada; May. (132.)

Cleome sparsifolia. Annual glabrous; stem flexuous, diffusely branched; leaves simple or 3-foliolate; leaflets small, oblong, entire, shortly petiolulate, mucronate, distant; stipules setaceous, scanty or wanting; floral bracts minute; flowers in loose racemes; sepals minute, distinct; petals oblong-lanceolate; filaments equal and nearly equaling the petals, the anthers a half shorter; pod linear, 4–6 times longer than the stipe.—Stem 1° high, nearly naked, with small (2–3″ long) scattered leaves; flowers large, yellow; petals (3″ long) with a broad claw and a large somewhat 2-lobed nectariferous scale on the inner base; siliques 1′ in length. In Carson Desert, near Ragtown, Nevada. August. Plate V. Fig. 1. A small plant; natural size. Fig. 2 and 3. A flower and petal; enlarged four diameters. (133.)

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[1] CLEOME, L. Sepals distinct or somewhat united. Stamens 6, or rarely 4. Torus minute. Pod linear or oblong, subsessile or stipitate.—Annual herbs, or shrubs, with digitate or simple leaves and racemed or solitary flowers. Benth. & Hook.

PLATE V

CLEOMELLA[1] PARVIFLORA, Gray. *Proc. Amer. Acad.*, 6. 520. Slender, diffusely branched; leaflets and the simple bracts linear; flowers small, on elongated filiform pedicels; pod obovate-globose, the stipe scarcely exceeding the calyx, and the style very short; seeds smooth.—3–8′ high, with very small flowers, (the petals and equal stamens about ½″ in length,) and with capsules about 1½″ in diameter. Collected by Anderson near Carson City, and by Cooper near Fort Mohave in Western Arizona. In wet subalkaline soil on Dry Creek, Monitor Valley, Nevada; July. (134.)

CLEOMELLA PLOCASPERMA. Low, ½–1° high, slender, diffusely branched; leaflets and the simple bracts linear-oblong; racemes many-flowered; flowers small, pale yellow, on filiform pedicels; stamens equaling the petals; pods somewhat 2-horned, shorter than the stipe; style short; seeds oblong-ovate, mottled brown, tessellated under the microscope.—Very near the last and also to *C. Mexicana*, but distinguished from both by the seed especially, which is more ovate, (a half longer than broad,) the surface finely marked like parti-colored braid-work. The flowers are twice larger than in the last and more densely racemed, and the broader capsule is upon a stipe 2″ in length. Near the Hot Springs in Ruby Valley, Nevada; September. It is also 28 Torrey, from "sterile saline plains, Humboldt County." *C. angustifolia*, Torr., of Texas and Colorado, (distributed in the Colorado collections by mistake under the name of *C. tenuifolia*,) has a rugose seed of similar shape. In authentic specimens of *C. Mexicana*, the pods are less prominent at the apex or even depressed with the horns projecting forward, the short style usually deciduous; seeds bluntly ovate, almost globular, and nearly smooth; flowers as in the present species. (135.)

CLEOMELLA LONGIPES, Torr. *Pl. Wright.* 1. 11. Leaflets spatulate-obovate or narrowly oblong, obtuse or retuse, entire or serrulate-scabrous upon the margins, shortly mucronate; racemes usually many-flowered, becoming elongated; upper bracts simple, petioled, mucronate; sepals ovate, acute; petals oval to linear-oblong, shorter than the filaments; ovary twice longer than the style and several times shorter than the stipe; capsule retuse, somewhat

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[1] CLEOMELLA, DC. Sepals distinct, short and spreading. Torus short, oblong. Stamens 6, incurved in æstivation. Pod short, obovate-rhomboidal, 4–8-seeded, with reticulate deltoid or boat-shaped saccate valves, and upon a filiform stipe. Seeds smooth, pitted or variously reticulated; embryo conduplicate; radicle elongated.—Annual glabrous herbs with stipulate 3-foliolate leaves, entire leaflets, and racemed leafy-bracted yellow flowers. BENTH. & HOOK.

2-horned, about half the length of the stipe; seeds nearly orbicular or broadly oval, very minutely rugose.—1–2° high, branching; leaflets ½–1′ long; flowers usually bright yellow; seeds less than 1″ in length; stipe ½–¾′ long, equaling the pedicel. The specimens resemble 857 Wright, 1851, which, though much larger than the plants of Gregg and Berlandier, has exactly the same seeds. Sonora and other States of Northern Mexico. Hot Springs of Grass Valley, foot of Havallah range, Nevada; June. (136.)

Var. (?) GRANDIFLORA. Leaflets ovate or orbicular; bracts similar, conspicuous, setaceously mucronate; sepals long-acuminate; capsules beaked with the long slender style; flowers showy, bright yellow, but variable in size, the petals 1–4″ long upon the same plant; seeds 1″ or more in length, dark colored, with the surface more or less rugose or irregularly pitted. The same as 89 Anderson, from near Carson City, and perhaps a distinct species. Truckee Valley and foot-hills of the West Humboldt Mountains, Nevada; 5,000 feet altitude; May, June. (137.)

POLANISIA UNIGLANDULOSA, DC. Glandular-pubescent; leaves 3-foliolate, leaflets and bracts oblong-lanceolate; stamens 8–16; style longer than the ovary; pods linear-oblong, attenuate at base; seeds turgid, rough and warty.—A low small-flowered form, (the petals 2–4″ long,) with the capsules short-stipitate, and equivalent to *P. trachysperma*, T. & G. From Western Texas and New Mexico northward to the Platte. Found in Truckee Valley, Nevada, and in Salt Lake Valley; July, August. (138.)

## VIOLACEÆ.

VIOLA PALUSTRIS, L. White Mountains of New Hampshire, and mountains of Colorado, Utah, Oregon, and California. Found in the Uintas and Wahsatch; 7–8,000 feet altitude; July. (139.)

VIOLA CUCULLATA, Ait. From the Arctic Circle to Florida and west, but more rare, to the Rio Grande and the Rocky Mountains. It is also reported from Southern California and from the Willamette Valley, Oregon. Found in the Pah-Ute range, Battle Mountains, and Ruby Valley, Nevada, and in the Wahsatch; 6,000 feet altitude; May–August. (140.)

VIOLA CANINA, L. From the upper section of the Southern States to latitude 59°, in the Rocky Mountains from Colorado northward, and frequent on the Pacific Coast as far south as Monterey. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 4,500–7,000, and in

a single locality at 10,000 feet altitude; May–September. Varying much in size and habit with the locality. (141.)

VIOLA CANADENSIS, L. From Hudson's Bay to North Carolina, west to the Rocky Mountains and New Mexico, (Fendler;) Washington Territory, (Douglas.) Rarely collected westward. Found in the Wahsatch in a single locality; 7,000 feet altitude; July. (142.)

VIOLA NUTTALLII, Pursh. Stem short, erect; leaves ovate-lanceolate, somewhat pubescent or nearly glabrous, nearly entire, attenuated into a long petiole; stipules lanceolate, entire or obscurely ciliate-toothed; sepals lanceolate, acuminate; flowers small, yellow, the spur very short.—Colorado and on the Upper Missouri and Saskatchewan, west to Oregon and California. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; June, July. In all the specimens the stems are very short and mostly decumbent, but a single pedicel equaling the leaves. (143.)

Var. PRÆMORSA. (*V. præmorsa*, Dougl.) Hirsute or very pubescent; leaves repandly denticulate; stipules often laciniately toothed; petals more or less tinged with brown. On the Pacific Coast from Vancouver to California. In the Washoe Mountains near Carson City; 5–6,000 feet altitude; April. (144.)

Var. VENOSA. A small subalpine form; more or less pubescent; leaves ovate or sometimes rhomboidal, cordate or truncate at base, conspicuously purple-nerved; flowers purplish-yellow, small.—Low, (2–3′ high,) showing the same tendency to the elongation of a single pedicel from each stem. It much resembles *V. pedunculata*, but the flowers are only a third as large. Frequent in the mountains from the West Humboldt to the Wahsatch, usually near the snow-line; 6–9,000 feet altitude; May–July. (145.)

VIOLA BECKWITHII, T. & G. *Pac. R.R. Surv.*, (*Beckwith's Rep.*,) 2. 119, *t.* 1. Subcaulescent; ascending stems abbreviated; cauline leaves biternately or pedately parted, decurrent on the margined petiole, the lobes or segments oblong-linear, hirsute-puberulent; stipules minute, scarious, entire; sepals linear, obtuse, ciliolate; lower petal barely saccate at the base, purple, with yellow claws, the two upper shorter and deep violet.—Foliage somewhat like that of *V. delphinifolia*, but the primary division compoundly divided in a ternate or pinnatisect manner; stem distinct; leaf-lobes ½′ or less in length; stipules very small and inconspicuous, except those of the lowest leaves;

peduncles 2′ long, naked; petals ½′ long; style short, clavate, minutely bearded at the gibbous summit; stigma lateral. Discovered by Beckwith in Agate Pass of the Quartz Mountains, Nevada.

## CARYOPHYLLACEÆ.

SAPONARIA VACCARIA, L. (*Vaccaria vulgaris*, Host.) Introduced; about the Mormon settlements in Utah, and thence westward to Reese Valley, Nevada. (146.)

SILENE ACAULIS, L. Greenland and throughout Arctic America to latitude 54°; White Mountains, New Hampshire; Rocky Mountains, Colorado; Wind River Mountains, Wyoming, (Frémont.) In the Uintas, Utah, and East Humboldt Mountains, Nevada; 10–12,000 feet altitude; August. (147.)

SILENE DOUGLASII, Hook. Minutely pubescent; stems erect, very slender; leaves remote, narrowly oblanceolate, attenuated at each end; flowers few, or sometimes solitary, on slender opposite peduncles; calyx oblong, at length inflated, abrupt at the base; petals bifid.—Stems numerous from a perennial base, ½–2° high, simple; leaves 3–6 pairs, 1–2′ long; petals light-pink; capsule with a long (1½″) pubescent stipe; seeds tuberculate-crested upon the margin. Collected by Douglas and Nuttall on the Oregon side of the Rocky Mountains, by Torrey and Brewer in the Sierra Nevada, and by Anderson near Carson City. Frequent in the East Humboldt Mountains, Nevada, and in the Wahsatch; 7–9,000 feet altitude; May–July. (148.)

Var. (?) With stems more strict, leaves oblong-lanceolate, calyx cylindrical and longer, (7–8″,) and petals less deeply bifid. (149.)

SILENE ANTIRRHINA, L. From Canada to Florida and westward to the Pacific. Found on the foot-hills of the Wahsatch and around Salt Lake Valley. (150.)

SILENE MENZIESII, Hook. Minutely glandular-pubescent; stems numerous, dichotomously branched, (6–12′ high,) weak, ascending, leafy to the summit; leaves crowded, ovate-lanceolate or oblong-ovate, acuminate, tapering to the base; peduncles axillary and terminal, 1-flowered; petals white, bifid, (3″ long,) exceeding the obovate calyx; styles bearded within.—From the Slave River to Oregon and southward to California and New Mexico. Found in the Truckee, Toyabe, and East Humboldt Mountains, Nevada, and in the Wahsatch; 6–7,000 feet altitude; May–August. (151.)

LYCHNIS APETALA, L. (*Melandryum*, Fenzl.) Pubescent; stem simple;

calyx ovoid, 10-striate, finally inflated, including the petals; seeds arilled.—On the Arctic coast from Greenland to Behring Strait, and southward to Labrador and the Saskatchewan; collected also in the Rocky Mountains of Colorado, and now on the Uinta Mountains, Utah; 12,000 feet altitude; August. The specimens approach closely to the typical form of the species; stems, (1-flowered, 3–4′ high,) nerves of the calyx and margins of the leaves glandular-pubescent; petals not exceeding the calyx; seeds large and margined; filaments and claws of the petals naked. The leaves are thin, nearly glabrous, and scarcely at all ciliated at base. (152.)

LYCHNIS AJANENSIS, Regel. (?) *Bull. de Mosc.*, 1861, *p.* 564. Leaves and stem clothed with a dense short pubescence, which becomes glandular above and upon the calyx; leaves ciliated at the base; petals shortly exserted, purplish; claws and filaments ciliated; seeds small, nearly immarginate.—This plant certainly resembles closely that of Siberia, differing only in the less exserted corolla and in the glandular character of the pubescence. Like the last in size and habit, and growing with it, but distinguishable at sight. (153.)

LYCHNIS DRUMMONDI. (*Silene Drummondii*, Hook. ?) Glandular-pubescent and viscid; stems erect, strict, simple; leaves remote, linear-lanceolate; raceme loose, few-flowered, with the elongated pedicels alternate or opposite; calyx oblong-cylindrical, erect.—Stems several, 1–3° high; flowers 3–5; petals white or purplish, the limb 2-lobed or emarginate, scarcely exceeding the calyx, minutely crowned and narrower than the obtusely strongly auricled claw; seeds reniform, uniformly tuberculated under the microscope, immarginate. The species is reported from Fort Vancouver and east to the Saskatchewan, from Oregon and Northern California, Western Arizona, New Mexico, Colorado, and Wyoming. The specimens in the herbariums of Dr. Gray and Dr. Torrey differ, like these, from British American specimens as described by Hooker and by Rohrback, in being decidedly a *Lychnis*, with 5 (very rarely 4) styles, and a 5-(very rarely 4-) toothed capsule, which is also more or less stipitate, and not at all 3-celled at base. In the Weber and Bear River Valleys and in the Uintas; 6–9,000 feet altitude; June–August. (154.)

LYCHNIS NUDA. Minutely pubescent; stems erect, slender; leaves narrowly oblanceolate, the cauline nearly linear, 2–3 pairs; flowers few, (2–5,) on slender alternate pedicels; calyx obovate, becoming much inflated; limb of the petals 4-lobed, exceeding the calyx; capsule upon a very short thick stipe; seeds tuberculately margined.—With the habit of *Silene Douglasii*.

but with more naked stems, 1–2° high; calyx 6″ long, marked with 10 broad green lines, shorter than the mature capsule; petals apparently white. Havallah Range and the East Humboldt Mountains, Nevada; 6–9,000 feet altitude; June–August. (155.)

Cerastium nutans, Raf. From Hudson's Bay and Canada south to North Carolina, and west to the Pacific. The only reported localities west of the Mississippi are the Santa Fé Mountains, (Fendler,) and the headwaters of the Missouri, (Stevens.) Collected by Anderson near Carson City; found in the Diamond Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; June, July. (156.)

Cerastium vulgatum, L., Var. Behringianum, Gray. Flowers large, petals and capsule half longer than the calyx, shorter than the pedicels; stems few (2–4)-flowered. Kotzebue Sound, and Rocky Mountains of Colorado. Uinta Mountains, Utah; 10,000 feet altitude; August. (157.)

Cerastium arvense, L. Canada to Georgia, and west to Colorado and Oregon. In the Uinta Mountains; 8,000 feet altitude; July. (158.)

Stellaria Jamesii, Torr. Viscidly pubescent; leaves lanceolate, slightly falcate, closely sessile; cyme divaricate; petals 2-lobed, twice longer than the oblong acute sepals.—Stems weak, 1–2° high; leaves usually 2′ or less in length; capsule equaling the calyx, deeply valved. Rocky Mountains, Colorado; Sandia Mountains, New Mexico; California, (Brewer.) Toyabe and East Humboldt Mountains, Nevada, and in the Wahsatch; 6–9,000 feet altitude; May–August. (159.)

Stellaria longipes, Goldie. Maine to Wisconsin, north to Arctic America, and west to Colorado, Oregon, and California. In the Toyabe Mountains, Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; June, July. (160.)

Stellaria borealis, Big. With the same range as the last. Found in the Uinta Mountains; 8,000 feet altitude; August. (161.)

Stellaria crassifolia, Ehrh. Kentucky "and northward;" California, (4718 Bolander;) Behring Strait. Found in the East Humboldt Mountains, Nevada, near Unionville; 5,000 feet altitude; June. (162.)

Stellaria umbellata, Turcz. Glabrous; stem weak; leaves ovate to oblong-lanceolate; peduncles axillary and terminal, divaricate, filiform and elongated, with scarious bracts; petals wanting; sepals short, (1″ long,) ovate, acute, nerveless or 1-nerved, (rarely 3-nerved;) capsule deeply valved, twice

longer than the calyx; seeds smooth.—Stem 6′–1° high. The character is drawn from Colorado and Utah specimens. *S. gracilis*, Rich., and *S. borealis*, var. *r.*, Hook., which are referred by Planchon to this species, have 2-parted petals, longer than the sepals. From Hudson's Bay to the Rocky Mountains, lat. 52–62°, and in the Rocky Mountains of Colorado. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 9–10,000 feet altitude; July, August. (163.)

STELLARIA KINGII. Glabrous below, glandular-pubescent above; stems strict, erect, numerous, from a somewhat woody base; leaves linear-setaceous, rigid, shorter than the internodes, mucronate, ciliate; petals deeply bifid, scarcely longer than the acute pubescent scarious-margined 1-nerved sepals; bracts ovate-acute, scarious; capsules becoming half longer than the (1½″ long) calyx, and dehiscing with 6 nearly equal teeth.—Stems 3–4′ high, somewhat cæspitose. East Humboldt Mountains, Nevada; 9,000 feet altitude; July. PLATE VI. Fig. 1. Stems; natural size. Fig. 2. A node and leaves. Fig. 3. A flower, laid open; both enlarged four diameters. (164.)

ARENARIA CONGESTA, Nutt. Cæspitose, glabrous; leaves long, linear-subulate, pungent; flowers in roundish compact heads, with crowded membranous bracts; sepals ovate, acute, membranous, obscurely 3-nerved, about half the length of the oblong petals; capsule equaling the calyx; seeds smooth.—Stem 6′–1° high, simple. Bear River Valley, (Nuttall;) Wind River Mountains, Wyoming, (Frémont;) Oregon, (Spalding.) Found in the Uinta Mountains, Utah; 8–10,000 feet altitude; July. (165.)

ARENARIA FORMOSA, Fisch. (*A. nardifolia*, Ledeb.) "Leaves linear-setaceous, scabrous-ciliate; stems erect, simple, and with the peduncles viscidly pilose; panicle trichotomous, few-flowered; sepals thick, obtuse, the inner ones very broad and pilose-glandular, half shorter than the obovate petals."—The present specimens are nearly glabrous, with the stems rather stout and strict, (5–10′ high,) from a woody caudex showing 20 annual rings; leaves 1–2′ long, somewhat scabrous on the margin, lower ones rarely fascicled, mucronate, and the mucro frequently curved; corymbs rather crowded; the short peduncles and ovate abruptly acute sepals glandular-pubescent; petals twice longer and the capsule becoming half (or frequently twice) longer than the calyx; uppermost bracts scabrous. Specimens in Herb. Gray of Tolmie from Mount Ranier, Palmer's 355 from Fort Whipple, Arizona, Lyall's from the Cascade Mountains, from the Kootanie and the Rocky Mountains, and Tor-

rey's 37 from near Donner Pass, appear to be the same—varying in the degree of pubescence, leafiness of the stem, and amount of fasciculation, covering both *nardifolia*, Ledeb., and *lychnidea*, Bieb. Wahsatch Mountains; 6,000 feet altitude; August. First collected by Richardson on the Arctic Coast. (166.)

ARENARIA FENDLERI, Gray. *Plant. Fendl., p.* 13. Stems numerous from a perennial caudex, simple, glabrous, imbricately many-leaved at base; leaves long, erect, setaceous, somewhat flattened, scabrous-serrulate, glabrous; cymes strict, few-flowered, and with the sepals glandular-pubescent; pedicels slender; sepals ovate-lanceolate, cuspidate-acuminate, green, with a broad scarious margin, 3-nerved, nearly equaling the obovate petals; styles exserted; capsule about equaling the calyx, 6-valved; seeds obliquely obovate, with a minute uncinate micropyle, papillose-scabrous; embryo horseshoe-shaped. Var. GLABRESCENS. Nearly glabrous throughout; the sepals shorter, broadly-ovate, acute; leaves short. It is nearly 70 Hall & Harbour. Found in the Toyabe Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; May–July. The species has been collected in Northern Arizona, New Mexico, and Colorado. (167.)

Var. SUBCONGESTA. Glabrous throughout; flowers more or less clustered upon short pedicels, or the lateral ones sessile; bracts broad and scarious; petals but little exceeding the ovate acuminate scarious sepals.—A low (6′ high) nearly subalpine form, from the East Humboldt Mountains, Nevada; 7–9,000 feet altitude; July. Collected also by Burke in Southern Idaho, and specimens gathered by Newberry in Northern Arizona and by Anderson near Carson City approach it nearly. It is in several respects intermediate between *congesta* and *formosa*, but seems more closely allied, through the last variety, with the true *A. Fendleri*. (168.)

ARENARIA PUNGENS, Nutt. Cæspitose, minutely glandular-pubescent; leaves rigid, subulate, canaliculate, pungent, 3-nerved; sepals lanceolate, obscurely 3-nerved, as long as the oblong-ovate petals.—Stems 2–4′ high, usually forming crowded tufts; leaves 3–6″ long. Collected by Nuttall in the Rocky Mountains, in lat. 41°, and by Brewer and Bolander in California. Found in the West and East Humboldt Mountains, and in Diamond Valley, Nevada; 6–9,000 feet altitude; June, July. (169.)

ARENARIA ACULEATA. Cæspitose, glabrous; leaves fascicled at the extremities of numerous short mostly barren shoots, glaucous, rigid, subulate, aculeate; stems nearly naked, somewhat scabrous above; flowers few, (6–8,) on

long slender erect pedicels; sepals ovate, acute, 3–5-nerved, shorter than the petals; capsule becoming twice longer than the calyx, splitting into 3 2-toothed valves; seeds oblong or orbicular, compressed, smooth.—Stems 6′ high; the numerous sterile shoots matted; leaves 6–9″ long, recent ones a bright emerald-green, the old persistent and purplish; petals somewhat emarginate or erose-dentate at apex. Frémont's Pass, East Humboldt Mountains, Nevada; 6,500 feet altitude; in fruit, August. (170.)

Arenaria verna, L. Cæspitose, pubescent or glabrous; leaves linear-subulate, 3-nerved, erect; cyme erect, few- or many-flowered; sepals ovate, acute, 3-nerved, mostly exceeding the petals.—Greenland, Arctic America, Oregon, and the Rocky Mountains of Colorado. Uinta Mountains, Utah; 11,000 feet altitude; August. (171.)

Var. hirta, Fenzl. Leaves minutely hirsute, obtuse. Greenland and Behring Strait. Found with the last. (172.)

Arenaria arctica, Stev. Cæspitose; leaves linear-subulate, obtuse, fleshy, minutely ciliate; peduncles glandular-pubescent, 1-(rarely 2–3-) flowered; petals about twice longer than the very obtuse 3-nerved sepals. Var. obtusa, T. & G. Leaves obscurely 3-nerved, carinate, serrulate-ciliate, the obtuse petals but half longer than the oblong sepals.—Stems 1–3′ high, often scarcely exceeding the leaves; capsule shorter or longer than the calyx. Specimens have the petals linear and the stamens very short, not one-fourth the length of the calyx. Arctic Coast from Greenland to Behring Strait; the variety in the Rocky Mountains of Colorado, and now in the East Humboldt and Clover Mountains, Nevada, and in the Uintas; 10-12,000 feet altitude; August, September. (173.)

Arenaria lateriflora, L. From Rhode Island to Wisconsin, north to lat. 60°, and west to the Rocky Mountains and Alaska. Found in the Uinta Mountains, Utah; 7,000 feet altitude; July. (174.)

Sagina Linnæi, Presl. (*S. decumbens*, T. & G.) Mostly glabrous; stems decumbent, branched, ascending, (1–3′ long;) leaves linear-subulate, very acute; peduncles much longer than the leaves; petals and sepals 5, equal, obtuse; capsule a little longer than the calyx.—The specimens are almost wholly apetalous, glabrous, with narrowly linear leaves, which are mostly mucronate; sepals oblong or ovate. Northwest Coast and Behring

Strait; California, (Brewer;) New Mexico, (Fendler,) and Colorado. Found in the Wahsatch Mountains, Utah; 8,000 feet altitude; July. (175.)

Sagina nivalis, Fries (?) Cæspitose; stems very short, erect; leaves subulate, mucronate, glabrous; peduncles short, strict; sepals 5, ovate, obtuse, with membranous margins, scarcely equaling the petals.—The single specimen accords well with Norway specimens from Blytt, in Herb. Eaton., but differs from the character in its pointless leaves, and petals shorter than the calyx. Stems very short, scarcely ½′ high, erect; leaves more subulate than in the last; sepals margined with purple, broad-ovate and very obtuse. Uinta Mountains, Utah; 12,000 feet altitude; August. (176.)

Spergularia media, Presl. On the coast and in salt marshes from Florida to Newfoundland, in Central British America from Lake Winnipeg to Bear Lake, and from Washington Territory to California. Found at a salt spring in Parley's Park, (Wahsatch Mountains,) Utah; 6,000 feet altitude; June, July. (177.)

## PORTULACACEÆ.

Portulaca oleracea, L. Near Unionville, Nevada. (W. W. Bailey.) Introduced. (178.)

Talinum pygmæum, Gray. *Proc. Amer. Acad.* 7. 332. Acaulescent; root fusiform; the linear leaves and 1–3-flowered scapes (1–2′ high) crowded; sepals orbicular, glandular-dentate or entire, persistent; petals white or rose-color, 5–6; stamens 4–7; stigmas 3–5; seeds few (6) to many.—With wholly the habit of a *Claytonia;* petals slightly united at base, unequal. Rocky Mountains, Colorado; Sierra Nevada, California; Cascade Mountains, Washington Territory. Usually alpine or subalpine; in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–10,000 feet altitude; June–August. (179.)

Claytonia Caroliniana, Michx., Var. lanceolata. (*C. lanceolata,* Pursh.) Cauline leaves ovate, lanceolate, or linear, sessile or short-petioled; petals more or less emarginate or entire, rose-color or white.—This can hardly be more than a variety of the eastern species. The leaves are very variable in width, but never exceeding 1–2′ in length; the venation is the same in both forms. Northern Arizona, (Ives,) and the Rocky Mountains of Colorado and northward to lat. 52°. Havallah Range and East Hum-

boldt Mountains, Nevada, and the Wahsatch; usually subalpine; 5–10,000 feet altitude; May–August. (180.)

Claytonia umbellata. Root tuberous, rounded; leaves orbicular or somewhat rhomboidal, the radical on long petioles, the cauline a single pair on petioles equaling the blade; flowers 3–5, in a terminal umbel; pedicels unequal, shorter than the leaves; sepals and petals obtuse.—Among rocks; Mt. Davidson and Truckee Pass, Nevada; 5–7,000 feet altitude; April, May. Plate VI. Fig. 4: a plant; natural size. Fig. 5: A flower, laid open; enlarged two diameters. (181.)

Claytonia arctica, Adams. *DC. Prodr.* 3. 361. Root fusiform; leaves fleshy; radical ones petioled, subspatulate, the cauline opposite, sessile, ovate; raceme secund; flowers large, the petals obovate, subemarginate. Var. megarhiza, Gray. *Amer. Jour. Sci.*, (*n. s.*,) 33. 406. With the cauline leaves lanceolate or linear-spatulate; raceme subsessile. Very variable in size of leaves and flowers; the former 1–6′ long and 2–12″ in width, and the petals 2–6″ long. Rocky Mountains of Colorado. Uinta Mountains, Utah; 11,000 feet altitude; August. (182.)

Claytonia perfoliata, Don. Stems and leaves numerous from an annual fibrous root; radical leaves on slender petioles, broadly rhomboidal, the cauline pair united into a single nearly orbicular perfoliate leaf; raceme fascicled, sessile; petals entire or slightly emarginate.—Stems 2–8′ high; flowers small, white. On the Pacific slope, from Alaska to Southern California, and in the Rocky Mountains. Found abundantly near Carson City, and in the Trinity and West Humboldt Mountains, Nevada, and by Prof. Eaton in the Wahsatch, near Salt Lake City, which is the most southern and eastern known locality; 5,000 feet altitude; April–June. (183.)

Claytonia Chamissonis, Esch. & Ledeb. (*C. aquatica*, Nutt.) Stems erect or decumbent, stoloniferous and rooting at the joints; roots bulbiferous; leaves opposite, spatulate or oblong-obovate, attenuate below, rather obtuse; racemes apparently axillary, peduncled, simple, few-flowered; petals obovate, entire, twice longer than the calyx.—Stems becoming 1° in length; leaves 1–2′ long; flowers white, rather large. California to Alaska and eastward in the Rocky Mountains to Colorado. Truckee Valley, Havallah Range, and Battle Mountain, Nevada, and in the Wahsatch and Uintas; 5–8,000 feet altitude; May–July. (184.)

SPRAGUEA[1] UMBELLATA, Torr. *Plant. Frémont.*, *p.* 4, *t.* 1. Perennial, with a short and thick caudex and subfusiform root; leaves obovate-spatulate, obtuse, entire; stems several, (2–4′ high,) with remote and smaller leaves; spikes numerous, leafless, short-peduncled, with ovate membranous bracts at base, in a terminal umbel or rarely somewhat panicled; flowers on short pedicels; petals shorter than the sepals; style slender, equaling the stamens; stigma more or less lobed.—Northern California and near Mt. Adams, Washington Territory. At the Steamboat Springs and on the East Humboldt Mountains, Nevada, at 5,000 and 10,000 feet altitude respectively; May and August. (185.)

SPRAGUEA PANICULATA, Kell. *Proc. Calif. Acad.* 2. 187, *t.* 56. Stems decumbent or prostrate, leafy-paniculate; leaves mostly radical, nearly equaling the stems, very minutely villous.—Possibly an unusually paniculate form of the last. Collected by C. H. Dorr at west base of Mt. Davidson, Nevada.

CALYPTRIDIUM[2] ROSEUM. Glabrous, diffusely branched, decumbent; leaves alternate, oblong-spatulate, obtuse, attenuate at the base; radical leaves few or none; flowers in numerous axillary and terminal peduncled scorpioid racemes; sepals very unequal, nearly orbicular; petals minute, rounded-oblong, free or attached at the apex; capsule oblong-ovate, not exceeding the calyx, 6–12-seeded.—Stems 3–6′ long, prostrate; leaves 1′ or less in length. The generic description below is slightly changed from that given by Nuttall, and by Bentham and Hooker, to include the present species. Found in the Truckee and Monitor Valleys, and also collected by Dr. Torrey near Empire City, Nevada; 4,200–5,500 feet altitude; May and July. PLATE VI. Fig. 6. A plant; natural size. Fig. 7. A flower, laid open and the petals removed. Fig. 8. A mature capsule; both enlarged four diameters. (186.)

LEWISIA[3] REDIVIVA, Pursh. Root fleshy, fusiform; leaves densely imbricated on the short thick caudex, linear-oblong, thick and succulent; scapes

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[1] SPRAGUEA, TORR. Sepals 2, orbicular-cordate, membranous-hyaline, persistent. Petals 4, hypogynous. Stamens 3, opposite to the petals and adherent to them at base. Ovary free, 8–10-ovuled; style bifid. Capsule membranous, 2-valved, globose-ovoid, compressed. Seeds laterally compressed, subreniform, shining.—Glabrous herbs with radical spatulate somewhat fleshy leaves, small scarious stipules, and flowers imbricate in dense scirpoid umbeled terminal spikes. BENTH. & HOOK.

[2] CALYPTRIDIUM, NUTT. Sepals 2, broadly ovate or orbicular, nearly flat, hyaline, persistent. Petals 2, somewhat adherent at apex, alternate with the sepals. Stamen 1, inserted opposite the lower sepal. Ovary free, few-ovuled; style very short, bifid. Capsule oblong or oblong-linear, hyaline, 2-valved. Seeds laterally compressed, orbicular, shining.—Annual diffuse herbs, with small flowers in subpaniculate racemes. BENTH. & HOOK.

[3] LEWISIA, PURSH. Sepals 4–8, broadly ovate, persistent. Petals 8–10. Stamens numerous. Ovary free, many-ovuled; style deeply 5–8-parted. Capsule globose, dehiscing transversely at base, sub-6-valved. Seeds reniform-globose or compressed. BENTH. & HOOK.

short and fleshy, 1-flowered, articulated above the middle, where they are involucrate with 5–7 subulate membranous verticillate scales; sepals somewhat hyaline; petals rose-color, 6–15″ long; capsule 3″ long, many-seeded; cotyledons accumbent.—Plant sometimes green with white flowers, but more often purplish; very tenacious of life. Mountains, from Oregon to Northern California and Utah; Northern Arizona, (Ives.) Frequent through Nevada, and also found on Pilot Rock Point at the south end of Salt Lake; 5–6,000 feet altitude; May, June. (187.)

Lewisia brachycalyx, Eng. *Proc. Amer. Acad.* 7. 400. Leaves spatulate or nearly linear; scape not jointed, 2-bracteate at the very base; calyx herbaceous, decussately 4-sepaled, 2–3 times longer than the (7–9) cuneate-obovate petals; stamens 10–15; stigmas 5–7, exceeding the style; cotyledons incumbent.—Reported from Utah, (Dr. J. W. Brewer,) Western New Mexico and Arizona.

## ELATINEÆ.

Elatine Americana, Arn. Throughout the Northern States; Missouri, Nebraska, and New Mexico. Collected by Dr. Torrey near Washoe Lake, Nevada.

Bergia[1] Americana, Seubert. (*Elatine*, T. & G.) Diffusely branched from the base; stems ascending, puberulent; leaves oblong-spatulate, rather acute, serrate, tapering into a short petiole; flowers on short pedicels, mostly solitary in the axils.—Stems 6–10′ high, glandular or hispid-pubescent; sepals denticulate, exceeding the narrowly oblong obtuse petals; stamens 5 or 10; dehiscence septifragal, as in *Elatine*, the entire septum remaining attached to the axis. Southern Texas. Found in Carson River Bottom, near Reed's Station; August. (188.)

## HYPERICACEÆ.

Hypericum Scouleri, Hook. Perennial, herbaceous; stems terete; leaves oblong-ovate, closely sessile or clasping; cyme compound; sepals broadly ovate, rather obtuse, one-third as long as the petals; stamens numer-

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[1] BERGIA, L. Flowers pentamerous. Sepals acute, herbaceous, or usually costate with the margin membranous-hyaline. Capsule subcrustaceous; dehiscence septicidal, with a greater or less width of the septa adherent to the axis.—Prostrate or much-branched herbs or shrubs, (the single North American species an erect annual,) often pubescent, with axillary solitary or cymosely fascicled flowers, larger than in *Elatine*. Benth. & Hook.

ous, clustered; styles 3, distinct, erect; capsules tricarpellary.—Stems $\frac{1}{2}$–2° high; leaves $\frac{3}{4}$′ long, very obtuse; sepals, petals, and anthers dotted with black; placentæ united to the middle. From Washington Territory and California to Colorado, New Mexico, and Sonora. Banks of mountain streams through Nevada and Utah; 6–8,000 feet altitude; June–September. (189.)

HYPERICUM MUTILUM, L. (?) From Canada to Lake Winnipeg, and southward to Florida, Arkansas, and Texas. A single specimen that perhaps belongs to this species was collected in the East Humboldt Mountains at an elevation of 9,000 feet; apparently annual; stem 3′ high, simple, quadrangular, 2–3-flowered; sepals broadly oval, obtuse, $1\frac{1}{2}$″ long, equaling or exceeding the oval petals; stamens about 18, distinct; capsule 1-celled, with 3 strictly parietal placentæ, exceeding the calyx; black dots none. (190.)

## MALVACEÆ.

SIDALCEA[1] MALVÆFLORA, Gray. (*Sida*, DC.) Glabrous or somewhat hispid; lower leaves roundish, more or less deeply 7–9 lobed, the cauline more narrowly and deeply 5–7 lobed; segments somewhat toothed; raceme terminal; calyx tomentose, the lobes ovate, acute, or acuminate; styles 7–8.—Stem 1–3° high, simple; radical leaves sometimes scarcely lobed, segments of the cauline often linear and entire; flowers variable in size, 1–2′ in diameter, occasionally white. From Washington Territory to Southern California, Sonora, New Mexico, and Colorado. Meadows and stream banks through Nevada and Utah; 6,000 feet altitude; June–September. The large-flowered form has the petals emarginate, slightly oblique, and the outer stamineal phalanges considerably longer than the inner. (191.)

Var. With smaller flowers, petals (3–6″ long) more oblique, the inner phalanges equaling or exceeding the outer. (192.)

Var. With sterile flowers, the petals nearly aborted and glandularly ciliate. (193.)

SIDALCEA CANDIDA, Gray. *Plant. Fendl., p.* 24. Stem and petioles sparingly hairy; lower leaves orbicular, 7-lobed, smooth, ciliate, segments coarsely 3–5-toothed; upper leaves 7-lobed, (the floral ones 3–5-lobed,) segments

[1] SIDALCEA, GRAY. Bractlets none. Calyx 5-cleft. Stamineal column double at top, the outer of 5, and the inner of 10 phalanges of stamens. Ovary-cells 5–9, 1-ovuled; styles filiform, stigmatose on the inner surface. Carpels membranous, beakless, indehiscent, separating from the short axis. Seed ascending.—Perennial herbs, with rounded, mostly lobed or parted leaves, and flowers in a narrow terminal raceme or spike. BENTH. & HOOK.

lanceolate, entire; stipules oval, ciliate; raceme short, dense, glandular-tomentose; pedicels very short; lobes of the tomentose calyx ovate; petals white; carpels 9–10, smooth and glabrous, (minutely apiculate at the inner angle,) mucronate.—Stem 2–3° high, simple; leaves often 8′ in diameter; raceme leafy at base; petals 8–12″ long; anthers blue. Rocky Mountains of New Mexico and Colorado. Wahsatch Mountains, Utah; rare; 6,000 feet altitude; July. (194.)

MALVASTRUM COCCINEUM, Gray. From the Saskatchewan to Mexico, and west to the Rocky Mountains and Colorado River. Found on the foot-hills near Salt Lake City and on Antelope Island, but not met with west of Salt Lake. May, June. (195.)

Var. GROSSULARIÆFOLIUM, Torr. Tall, (2° high;) leaves exceedingly variable in degree of dissection; flowers large, petals often ¾′ long. Collected by Tolmie in Southern Idaho; by Wright in New Mexico, and also by Frémont and Stansbury. It is very frequent through Northern Nevada to the complete exclusion of the low eastern form, with which it cannot be confounded, though it would be difficult to find specific distinctions. The cells are always 1-ovuled. Specimens from the Goose Creek Mountains, Northwestern Utah, approach *M. pedatifidum*, Gray, of Texas and New Mexico, which, however, has 1–2-seeded carpels, and is therefore a good *Sphæralcea* and apparently the same as *S. incana*, var. *dissecta*. (196.)

MALVASTRUM MUNROANUM, Gray. (*Malva*, Dougl.) Scabrous with a short stellate pubescence; leaves cordate-orbicular, (or cuneate at base and subrhomboidal,) crenate, often somewhat 3–5-lobed; flowers more or less densely fascicled along the leafless upper branches, forming an interrupted spike; bractlets setaceous; calyx more or less densely tomentose, the lobes broad-triangular; corolla purple; carpels 10–12, nearly glabrous, not beaked.—Stems 1–2° high, several from a woody base; with much the habit of the last, but readily distinguished by the more fascicled flowers, which are also smaller, (petals ½′ long,) and by the much less dissected leaves, which are rarely lobed to the middle. It varies much in the density of the pubescence, in the compactness of the fascicles, of which the flowers are sometimes nearly sessile, and in the size and obtuseness of the calyx-lobes. The segments of the leaves are also either very obtuse or somewhat acuminate. From Washington Territory to Southern California, Arizona, and Sonora. Found on Stansbury Island, in

the Wahsatch Mountains, and Bear River Valley, Utah; 4,500–6,000 feet altitude; June, July. (197.)

SPHÆRALCEA[1] EMORYI, Torr. *Plant. Wright.* 1. 21. More or less hoary or fulvous-tomentose; stems several, from a woody base, usually simple, long racemed at summit; leaves cordate at base, suborbicular, triangular or subhastate, more or less deeply 3–5-lobed, crenate-dentate, long petioled; peduncles 1-several-flowered; upper flowers fascicled; capsule subglobose, tomentose, 12–15-carpeled; carpels mucronate.—This species also is quite variable, and includes without doubt *S. Wrightii*, Gray. It is so frequently the case that the carpels are 1-seeded, without trace of the upper ovule, that it is sometimes difficult to distinguish this species from the last. It may, indeed, be doubted whether they are not one It is intermediate between *S. incana* and *S. Lindheimeri*, (which latter probably includes as a very tomentose form *Malvastrum Frémontii*, Torr., whose carpels are occasionally 2-seeded,) differing from *S. incana* chiefly in its larger flowers, fruit, and calyx, the capsules more frequently mucronate above, and the fruit covered with a denser stellate tomentum, which on boiling readily separates in mass. *S. incana*, var. *oblongifolia* is *S. Fendleri*, Gray, and apparently nearly approaches *S. angustifolia*, Benth. The limits of these species are yet to be accurately defined. Reported previously from Northern Mexico, New Mexico, and Arizona, and not rare in the valleys of Nevada; 5–6,000 feet altitude; May–July. (198.) Some of the specimens accord with others which are placed with *Malvastrum Munroanum*, in every respect except that the carpels are 2-seeded. (199.)

SIDALCEA ACERIFOLIA, Nutt. Scabrous with a stellate pubescence; leaves cordate, deeply 5–7-lobed; lobes acute, coarsely serrate; racemes leafy below, naked above, the flowers clustered on short peduncles; carpels 12–14, pointless.—Stem 3–6° high, much branched; leaves 2–6′ in diameter; petals $\frac{3}{4}$–$1\frac{1}{2}$′ in length, light purple or nearly white; carpels pilose, dehiscent on the back. On the Columbia and its tributaries, from the Rocky Mountains to the ocean. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch; 6–8,000 feet altitude; June–September. (200.)

SIDA HEDERACEA, Torr. (*Malva*, Dougl.) Stellately pubescent; stem

[1] SPHÆRALCEA, St. Hill. Characters nearly as in *Malvastrum*, but the carpels 2-ovuled, the lower ovule ascending, the other pendulous, (often by abortion 1-seeded,) 2-valved, often truncate and pointed above. BENTH. & HOOK.

short, herbaceous, procumbent; leaves reniform-cordate, oblique at the base, crenate; peduncles axillary, solitary, 1-flowered; petals oblique, pubescent externally, yellow; carpels 8–10, pointless.—New Mexico to Sonora, California, and Oregon. In Salt Lake Valley; June–October. (201.)

## LINACEÆ.

LINUM PERENNE, L. Perennial, glabrous; leaves scattered, linear, acute; flowers nearly opposite the leaves and terminal; peduncles becoming elongated and nodding in fruit; sepals oval, with membranous margins, shorter than the globose capsule; petals free, blue, retuse, 3–4 times exceeding the calyx; styles 5; capsule 5-celled, with bearded dissepiments.—Stems ½–3° high; flowers large. From Canada, west to the Pacific and north to the Arctic Sea, and west of the Mississippi from Arkansas to Northern Mexico and California. Frequent in Nevada and Utah; 5–10,000 feet altitude; May–September. (202.)

LINUM (LINASTRUM) KINGII. Perennial, glabrous; stems numerous, ascending, panicled above; leaves alternate, linear or narrowly oblong, obtuse; glandular stipules none; flowers yellow, on pedicels longer than the calyx; sepals ovate, acute, glandular-margined; petals free; filaments dilated at base; styles 5, free, equaling or a little exceeding the stamens; capsule globose, cuspidate, 10-valved, somewhat longer than the calyx.—Stem 4′–1° high, shrubby at base, the caudex sometimes showing 10 or more annual rings; flowers showy, with petals 5″ long; capsules 1½″ in diameter. In the Uinta and Wahsatch Mountains; 8–10,000 feet altitude; July, August. (203.)

## GERANIACEÆ.

GERANIUM RICHARDSONII, Fisch. & Mey. (*G. albiflorum*, *Hook.*) Very near *G. maculatum*, L., from which it is distinguished by the much deeper divisions of the style, (2–3″ long,) the pilose filaments, and the short dense (rarely pilose) pubescence, which is somewhat glandular above.—Stems 2° high, numerous; flowers of various shades of purple, or white. The white-flowered specimens are often more or less pilose, but show no other difference. *G. Frémontii* is of less size, with smaller leaves, which are more truncate at base and less deeply and less sharply divided. In the Rocky Mountains from New Mexico to the Saskatchewan; also collected by Brewer

in the Sierras, near Mono Pass. Abundant in the watered cañons of Nevada and Utah; 5–8,000 feet altitude; May–August. (204.)

GERANIUM CAROLINIANUM, L. From latitude 52° to Northern Mexico. Found in the West Humboldt Mountains, Nevada, and in Utah in the Wahsatch and on Antelope Island; rare; 5–7,000 feet altitude; June–September. (205.)

Var. LONGIPES. Peduncles usually solitary and, with the pedicels, much elongated. This form is also frequent in California and is 111 Parry from Colorado. (206.)

ERODIUM CICUTARIUM, L'Her. Throughout the region west of the Rocky Mountains, from New Mexico and Southern California to Washington Territory; sufficiently abundant in localities to be of value for pasturage. At 4–5,000 feet altitude; May–December. (207.)

FLŒRKIA PROSERPINACOIDES, Willd. From Western New England and Pennsylvania to Missouri Found in Parley's Park, in the Wahsatch Mountains, Utah; 6,500 feet altitude; June. (208.)

## RUTACEÆ.

PTELEA ANGUSTIFOLIA, Benth. A *Ptelea* was reported by Mr. H. Custer, of the Topographical Corps, as seen by him in the upper part of the Wahsatch Range. No specimens were collected, and none was seen elsewhere. It is probably this species, which occurs in New Mexico, Arizona, and California; distinguished from *P. trifoliata* by its much smaller and more emarginate fruit, and by its oblong or lanceolate leaves, pubescent or villous, becoming smooth and shining with age. (209.)

## CELASTRINEÆ.

PACHYSTIMA[1] MYRSINITES, Raf. (*Oreophila myrtifolia*, Nutt.) Stems 1–2° high, very leafy; leaves roundish-oval or oblong, ½–9″ long; flowers somewhat fascicled, on short peduncles, small, green, or brownish, apparently always perfect.—Found in flower in September and in the following May, and perfecting its fruit in July. From Washington Territory throughout the Rocky

[1] PACHYSTIMA, RAF. Petals and stamens 4, inserted on or below the margin of the broad flat quadrangular disk that covers the small pyramidal ovary and adheres to the throat of the short obconic 4-lobed calyx. Style very short; stigma obsoletely 2-lobed. Capsule coriaceous, oblong, acute, 2-celled, loculicidally 2-valved; cells 1–2-seeded. Seeds inclosed in a white membranous dissected aril.—A low branched leafy glabrous shrub, with opposite short-petioled mostly serrate evergreen leaves and axillary flowers. BENTH. & HOOK.

Mountains to Colorado and New Mexico, and in Northern California. In the Raft River and Wahsatch Mountains, Utah; 5–7,000 feet altitude. (210.)

## RHAMNEÆ.

CEANOTHUS VELUTINUS, Dougl. Leaves round or ovate-elliptical, rather obtuse, subcordate, glandularly crenate-serrulate, coriaceous, glabrous and shining above, velvety-canescent and strongly 3-ribbed beneath; panicles axillary, compound, on rather long peduncles. Var. LÆVIGATUS, T. & G. Leaves nearly glabrous beneath.—A densely growing shrub, usually 2–3° high, with leaves 2–3′ long on ½′ petioles; flowers white. From Washington Territory to Colorado and California. Frequent on the higher mountains from the Washoe Range to the Wahsatch; 7–9,000 feet altitude; June–September. The more pubescent form was *not* seen. (211.)

CEANOTHUS SOREDIATUS, H. & A. Branches terete, resinous-verrucose; branchlets spreading, somewhat silky; leaves elliptic-ovate, obtuse, somewhat coriaceous, glandular-denticulate, 3-ribbed, glabrous above, canescent beneath, silky on the nerves; clusters many-flowered, dense, scarcely exceeding the leaves; flowers blue; ovary without lobes.—Frequent in California. Var. GLABRA. Leaves (½–1′ long) glabrous or but slightly silky on the veins beneath, mostly broadly ovate and subcordate, denticulate or entire; flowers white, in loose lateral panicles, longer than the leaves; a low shrub of rather slender habit, 2° high. Found only on the East Humboldt Mountains, Nevada; 8,000 feet altitude; in flower, July, August. (212.)

CEANOTHUS DIVARICATUS, Nutt. Branches terete, pruinose; branchlets spreading, usually thorny; leaves elliptic-oblong or oblong-ovate, subcoriaceous, 3-nerved, minutely glandular-serrate, glabrous and shining above, paler beneath and subpubescent especially on the nerves; panicles elongated and spicate-racemose, densely flowered; flowers blue, clustered; ovary subglobose, without protuberances. California and Eastern Oregon. Var. EGLANDULOSUS, Torr. *Pac. R. R. Surv.*, 4. 75. Leaves entire, very obtuse. California. *C. cordulatus*, Kell., (in *Proc. Calif. Acad.*, 2. 124, *Fig.* 39,) from the Washoe Mountains, Nevada, is probably this variety, with whitish flowers and ovate-cordate, often emarginate leaves.

CEANOTHUS PROSTRATUS, Benth. *Plant. Hartw.*, *p.* 302. Prostrate, glabrous, much branched; branches and leaves opposite; leaves cuneate, tricuspidate, (sometimes oblanceolate and entire, often obovate-cuneate and

spinose-toothed to the middle,) coriaceous, pinnately veined; flowers blue, subumbeled, terminal.—Evergreen, matting the ground: young leaves silky-canescent; capsule usually solitary, with 3 strong protuberances, 4‴ in diameter. Sierras of Northern and Middle California. Found only on the Washoe Mountains, Nevada, under pines; 5–7,500 feet altitude; May. (213.)

## SAPINDACEÆ.

ACER GRANDIDENTATUM, Nutt. Leaves cordate or truncate at base, rather deeply 3-lobed, with broad round sinuses; lobes rather acute, coarsely sinuate-dentate; the umbel-like corymb nearly sessile, few-flowered, the pedicels long and nodding; fruit glabrous, with diverging wings.—Collected by Nuttall, probably in the Wahsatch, and by Douglas on the head-waters of the Columbia. Frequent in the cañons of the Wahsatch, rarely attaining 1° in diameter and 30–40° in height. The leaf has the outline of that of *A. macrophyllum*, but is only 3–5′ in breadth. Fruit broadly winged, 1′ long. (214.)

ACER GLABRUM, Torr. (*A. tripartitum*, Nutt.) Leaves subreniform-orbicular in outline, 3-lobed or more usually 3-parted, the segments short and broad, acutely incised and toothed, somewhat 3-lobed, the middle one cuneate; corymb umbeled, pedunculate, few-flowered; sepals about 8, linear-oblong; petals wanting; fruit glabrous, wings broad, diverging.—A shrub, 6–10° high, with variable foliage. From Washington Territory to Colorado, New Mexico, and California. Rare in the East Humboldt Mountains, Nevada; more frequent in the Wahsatch and Uintas; 6–10,000 feet altitude. (215.)

NEGUNDO ACEROIDES, Mœnch. From Florida to Pennsylvania and Wisconsin and northward, on the Red River and Saskatchewan, to latitude 54°; in the valleys of the Rocky Mountains from New Mexico northward, and in California. Found only in the Wahsatch, Utah, but there very abundant; 5–6,000 feet altitude. (216.)

## ANACARDIACEÆ.

RHUS GLABRA, L. From West Florida to the Mississippi, northward to Canada and the Saskatchewan, and westward in the Indian Territory and

Northern New Mexico; reported also from Oregon. Found only on the foot-hills of the Wahsatch in Salt Lake Valley. (217.)

RHUS TOXICODENDRON, L. From Florida to the Rocky Mountains of New Mexico, and northward to Canada and the Saskatchewan; also on Mt. Hood and the Blue Mountains of Oregon, (Douglas.) Found only in the Wahsatch and on Antelope Island, Salt Lake; 5,000 feet altitude. (218.)

RHUS AROMATICA, Ait., Var. TRILOBATA, Gray. (*R. trilobata*, Nutt.) Leaves small, rarely exceeding 1′ in length, usually glabrous; leaflets lobed, the divisions entire or sparingly crenate.—Growing in dense leafy clumps, 3–6° high, and having a heavy disagreeable odor. It is the prevalent western form, extending from Western Texas to Southern California, and throughout the Rocky Mountains to the Upper Missouri. Found on the foot-hills around Salt Lake Valley and at the north base of the Raft River Mountains, Utah. (219.)

## LEGUMINOSÆ.

THERMOPSIS FABACEA, DC., Var. MONTANA, Gray. (*S. montana*, Nutt.) Somewhat silky-pubescent; leaflets (1–3′ long) lanceolate, cuneate at base; stipules oblong-ovate, equaling or exceeding the petioles; legumes (2–3′ long) linear, erect, nearly straight, somewhat silky, about 10-seeded.—Stems numerous, branched, 1–2° high. *S. macrophylla* is apparently quite distinct. From Southern California to New Mexico, and northward in the mountains to the Columbia. On stream banks in Nevada and Utah, rather rare and usually solitary; 5–6,000 feet altitude; June–August. (220.)

LUPINUS PUSILLUS, Pursh. Annual, low, very hirsute branching from the base; leaflets 3–7, (more usually 5,) obovate-lanceolate, narrowed at the base, rather obtuse, smoother above; racemes spicate, usually short-peduncled; flowers alternate; bracts persistent; calyx ebracteolate, the upper lip 2-toothed, shorter than the obscurely 3-toothed lower one; legumes hirsute, about 2-seeded; seeds orbicular, flattened.—Stems 3–9′ high; racemes often on very short peduncles, 1–2′ long; flowers light-blue, wings equaling the keel; legumes ¾′ long; seeds 1½–2″ in diameter. From New Mexico and Arizona to the Platte, California, and Washington Territory. Found in the valleys of Western Nevada; 5,000 feet altitude; May, June. (221.)

LUPINUS BREVICAULIS. Annual, hirsute; stems very short (1–2′ high;) leaflets 5–8, (usually 7,) obovate, narrowed at base, very obtuse or retuse;

peduncles about equaling the leaves; racemes usually very short and few-flowered; flowers small, deep blue; calyx often bracteolate, upper lip very short, truncate, obsoletely toothed, membranous, lower lip entire or obscurely toothed; keel slightly exceeding the wings; pods 2–3-seeded; seed about 1″ in diameter.—Near *L. pusillus;* distinguished especially by the characters of the calyx. In the valleys and lower cañons of Western Nevada to the East Humboldt Mountains, (more frequent than the last,) and on the islands of Salt Lake; 5–8,000 feet altitude; May–July. Also collected by Dr. Anderson (84) near Carson City. PLATE VII. Fig. 1. A plant; full size. Fig. 2. A flower. Fig. 3. The petals. Fig. 4. The stamineal column; all enlarged two diameters. (222.) A form of this was collected with some of the peduncles much elongated and bearing above the leaves loose racemes of reduced florets, apparently perfect in all their parts, but usually sterile. (223.)

LUPINUS UNCIALIS. Annual, dwarf, villous, diffusely branched, leafy; leaflets 5, oblong-spatulate, obtuse; flowers small, axillary, solitary; the peduncles equaling the leaves or shorter; legumes 2-seeded.—Very small, but 1′ high; leaves on $\frac{1}{4}$–$\frac{1}{2}$′ petioles, leaflets 2″ long; stipules adnate, obtuse; bracts short, oval; the upper lip of the calyx deeply 2-cleft, the lower larger, 3-toothed, the middle tooth small; vexillum obovate, shorter than the wings and keel, the sides scarcely at all reflexed; wings free or but slightly united; keel rather obtuse; flowers ochroleucous, the keel tipped with purple. Found on the dry foot-hills of the Truckee and Pah-Ute Ranges, Western Nevada; 5,000 feet altitude; May, June. PLATE VII. Fig. 5. An entire plant; twice the natural size. Fig. 6. A flower. Fig. 7. Calyx, opened out. Fig. 8. The petals. Fig. 9. The stamineal column, opened. Fig. 10. Ovary; all enlarged four diameters. (224.)

LUPINUS PARVIFLORUS, Nutt. Erect, branching, glabrous or somewhat hirsute-pubescent; leaflets 5–9, oblong-obovate, obtuse or acute, longer than the petiole; racemes elongated; flowers small, somewhat scattered; calyx silky-pubescent, lips nearly equal, the upper 2-toothed, the lower entire; keel ciliate; legume hirsute, 2-seeded.—A well-marked species, tall, (2–4° high,) dark green and nearly glabrous, the leaflets expanded and petioles short. Collected in the Rocky Mountains, near the sources of the Snake River, by Nuttall, Frémont, (No. 413, 1845,) and Tolmie. Frequent on

shaded mountain sides in the Wahsatch; 7–9,000 feet altitude; June–August. (225.)

Lupinus polyphyllus, Lindl. (?) Specimens from Dr. Anderson (46) near Carson City, Dr. Torrey, (83 and 83 a,) from Washoe and Donner Lakes, and from Burke in Southern Idaho, may belong to this species, but are more probably distinct. Stems slender, 1–2° high, branching, sparingly pubescent; leaflets 7–9, oblanceolate, about equaling the petioles, (2–3′ long, 4–6″ wide,) acute, glabrous above, subpubescent beneath; racemes loose, 6–12′ long; bracts setaceous, hairy; flowers subverticillate; lips of the calyx nearly equal in length, somewhat silky, nearly entire; petals equal, 5″ long, the keel nearly semicircular; legumes rufous-hairy, 7–9-seeded, 16″ long, 3–4″ broad.

Lupinus laxiflorus, Dougl. Stem minutely silky-puberulent; leaflets 7–9, (rarely 11,) linear-oblong, rather obtuse and mucronate, silky-pubescent both sides; flowers scattered or a little verticillate, in a loose elongated raceme; upper lip of calyx saccate at base, minutely 2-toothed at the apex, the lower entire; legumes silky, 2–5-seeded.—Stems 2° high; flowers blue or ochroleucous. According exactly with authentic specimens in Herb. Gray. It appears to have been collected only in the mountains of Oregon. Found in the East Humboldt Mountains, Nevada; 7,500 feet altitude; July. (226.)

Lupinus argenteus, Pursh. (Including *L. laxiflorus*, Var. *foliosus*, T. & G.) Distinguished from the last only by the less saccate calyx and the somewhat smoother or even glabrous upper surface of the leaflets. Some of the specimens are of this character, but others seem to unite the two species, and leave little doubt that they must be reduced to one. Clover Mountains, Nevada, and Wahsatch Mountains, Utah; 5,000 feet altitude. (227.)

Lupinus flexuosus, Lindl. "Shrubby" (?), ascending, silvery-silky; stems very flexuous; leaflets obovate-oblong, shorter than the petiole; flowers in distant, somewhat regular whorls; upper lip of calyx somewhat 2-cleft, the lower entire; banner slightly silky; keel ciliate.—The plants accord with authentic specimens in Herb. Gray, but are not at all shrubby, and more frequently rather villous than silky. It is the most prevalent lupine of Nevada, the early spring forms frequently very villous; stems 1–2° high, flowers blue, occasionally ochroleucous. Reported only from Oregon. Frequent in the valleys and mountains of Nevada; 5–9,000 feet altitude; April–August. (228.)

Var. (?) Much more silvery and silky than usual, and with the racemes nearly sessile; approximating to the next and also much resembling what has been called *L. decumbens*, Var. *argophylla*. Grass Valley and Regan's Valley, Western Nevada; 5,000 feet altitude; June. (229.)

LUPINUS MEIONANTHUS, Gray. *Proc. Amer. Acad.* 6. 522. Silvery-canescent throughout; stems ascending from a perennial root; leaflets 5–9, oblanceolate, obtuse; stipules small, setaceous; bracts shorter than the calyx; flowers very small, (scarcely 3″ long,) verticillate, in a crowded spike-like raceme; calyx longer than the pedicel, bractless, lips nearly entire, about equal to the glabrous corolla; keel with a broad obtuse apex, inflexed, ciliate; legumes (½–1′ long) ovate, silky, 1–2-seeded. Near Carson City, (Anderson.)

Var. (?) HETERANTHUS. Flowers somewhat larger, with the calyx gibbous or even spurred at base, and the lobes more elongated; legumes oblong, 3–5-seeded. Of exactly the habit of the last, with stems 1° high, the racemes nearly sessile, and scarcely exceeding the leaves. Collected by Anderson (92 and 232) and also by Dr. Torrey (88) in the same region with the last, near Carson City. It would seem probable that this is the ordinary form of the species, the other being but an abnormally small-flowered variety. Washoe and West Humboldt Mountains, Nevada; 7,000 feet altitude; July–September. (230.)

LUPINUS CALCARATUS, Kell. *Proc. Cal. Acad.* 2. 195, *t.* 60. Erect, 8–10′ high, silky-pubescent throughout, leafy; leaflets 7–10, linear-lanceolate, acute, mucronate; stipules ovate, acuminate, persistent; flowers in a rather close and short raceme; bracts subulate, deciduous; calyx deeply spurred at base, minutely bracteolate, the upper lip short, 2-toothed, white, the lower larger, entire, acute; banner and wings somewhat pubescent externally, and the keel ciliate; pods hairy, 4-seeded.—Flowers white, the spur exceeding the pedicels. California (1891 Brewer) and near Carson City, (30 and 31 Anderson.)

LUPINUS LEUCOPSIS, Agardh. Silky-tomentose, with whitish hairs; leaflets 7–9, lanceolate, equaling the upper petioles; flowers somewhat verticillate in a rather dense raceme; vexillum silky-pubescent externally; calyx-lobes nearly equal, the upper 2-toothed; legumes tomentose, 4-seeded.—Whole plant silvery, 2° high; flowers light blue or ochroleucous. Collected by Douglas in Oregon. In the Wahsatch, Utah; 6,000 feet altitude. (231.)

Var. (?). Differing from the last in its somewhat broader leaflets, less

silvery pubescence, and less crowded racemes. Found in the Wahsatch and on Antelope Island, Salt Lake. (232.)

LUPINUS SULPHUREUS, Dougl. Stem erect, sulcate, silky; leaflets 13–15, narrowly lanceolate, densely sericeous both sides, shorter than the petiole; stipules subulate, short; flowers somewhat verticillate in a dense thick raceme; calyx ebracteolate; keel glabrous.—A specimen of what seems to be this species was collected on Mt. Davidson by Dr. Bloomer; stem rather stout, 18′ high; leaflets about 11, (1–2′ long;) flowers apparently yellowish, (6″ long,) the calyx deeply spurred and with the short lips nearly equal; racemes but 3′ long.

LUPINUS SERICEUS, Pursh. Silky-villous; leaflets 7–9, lanceolate; flowers subverticillate in an elongated raceme; calyx bracteolate; corolla light blue, glabrous or slightly silky.—Stems 18′ high; racemes 6′ long; bracts setaceous, subpersistent; flowers 6″ long, frequently ochroleucous; calyx gibbous or slightly saccate at base, the linear-lanceolate lobes subequal; legumes densely villous, 1′ in length. Oregon. In the valleys of Nevada and abundant in the Wahsatch; 5–6,000 feet altitude; June. (233.)

LUPINUS ARIDUS, Dougl. (?). Very silky-hirsute, with fulvous hairs; stem low, much branched from the base; leaflets 7, oblong-lanceolate, one-third the length of the petiole; flowers in a very dense conical spike; bracts subulate, subpersistent, shorter than the bracteolate calyx; keel woolly-ciliate: legumes villous.—The specimens placed here are low (6′) and somewhat cæspitose, very villous, with white hairs; racemes short (1′) or elongated, (3–6′,) scarcely exceeding the long slenderly petioled leaves; bracts conspicuous, setaceous, and equaling the nearly sessile flowers; keel glabrous or slightly ciliate; pods ovate-oblong, 2–3-seeded. It appears to be an intermediate form between *L. aridus* and *L. cæspitosus*. From Washington Territory and the head-waters of the Missouri to California. In the valleys of the Wahsatch Mountains; 6,000 feet; July. (234.)

LUPINUS LEUCOPHYLLUS, Lindl. Densely villous, with a somewhat fulvous silky tomentum; tall; leaflets 7–9, linear-lanceolate or lance-oblong, acuminate, about equaling the petiole; spikes dense, elongated, subsessile; bracts often longer than the flower; flowers subsessile; vexillum pubescent; legumes villous, 3–5-seeded.—A stout, well-marked species, 2–3° high. Dr. Gray notes that *L. plumosus*, Dougl., is the same. From Oregon to Northern California and the head-waters of the Platte, (Frémont.) Found in Heber Valley, in the Wahsatch; 6,000 feet altitude; July. (235.)

LUPINUS ——— (?). Stem stout, 2° high, simple, sparsely silky-villous; leaflets 9–11, obovate-lanceolate, (2′ long,) subacute, glabrous above, appressed villous beneath; raceme elongated; flowers glabrous, rather large, blue; upper lip of calyx 2-toothed, lower 3-toothed; legume broadly oblong, (1′ or more long, 5″ broad,) about 5-seeded, very hairy; seeds large, 2–3″ in diameter. East Humboldt Mountains, Nevada; 5,000 feet altitude; June. (236.)

LUPINUS ANDERSONI. Specimens were collected near Carson City by Dr. Anderson, (9, 108, and 121,) very distinct in their habit, and seeming scarcely to belong to any described species. Slender and much branched, apparently 1° high, minutely puberulent throughout; leaflets 7, oblong-lanceolate, acute or obtuse, about equaling the petioles, (1–2′ long;) racemes short or becoming elongated, (2–6′,) loosely flowered; flowers scattered or subverticillate, blue or ochroleucous, (3–6″ long;) bracts small and ovate, much shorter than the pedicels; calyx broad-campanulate, but slightly gibbous, the lobes nearly equal, entire, somewhat obtuse; legumes subpubescent, 4–6-seeded, (15″ long, 4″ wide.)

LUPINUS TORREYI, Gray MSS., in Herb. 82 Torrey from near Washoe Lake, Nevada, as also his 89 from Donner Pass and 6286 Bolander from Yo-Semite Valley, California, have been thus named by Dr. Gray. It is near *L. minimus*, and likewise resembles *L. aridus*, with low stems, (6–12′,) rufous silky-villous pubescence, and dense long-bracted racemes, (2–4″ long;) leaflets 7, (1′ long,) acute, tufted-mucronate, on long slender petioles; bracts and sepal-lobes linear-lanceolate; flowers blue-purple, 3–5″ in length; legumes silky, ovate-oblong, 2-seeded.

LUPINUS BREWERI, Gray. *Proc. Amer. Acad.* 7. 334. Small and shrubby, very much branched, cæspitose, prostrate, silvery, with a closely appressed silky pubescence; stipules subulate; leaflets 7–10, spatulate or cuneate, retuse, (3–4″ long;) raceme short, (1′,) densely flowered; upper lip of the bracteolate calyx 2-parted; corolla violet, (3–4″ long;) keel scarcely ciliate. Yo-Semite Valley, (Brewer;) near Carson City, Nevada, (Anderson.)

MEDICAGO SATIVA, L. Near Unionville, Nevada. Doubtless introduced. (237.)

MELILOTUS ALBA, Lam. Stream banks near Salt Lake City; introduced. (238[a].)

MELILOTUS PARVIFLORA, Desf. Lower leaflets obovate-roundish, often

nearly entire; upper ones cuneate-oblong or linear, truncate or emarginate, serrate; flowers yellow, minute. Collected by Stretch in Western Nevada; doubtless introduced.

TRIFOLIUM LONGIPES, Nutt. Somewhat pubescent; stems erect or ascending, simple; petioles slender; leaflets linear-lanceolate, serrulate, silky-pubescent beneath; stipules semi-lanceolate, acuminate; heads roundish-ovate, ebracteate, on long peduncles; calyx-teeth setaceous, longer than the tube, nearly equal; petals lanceolate; ovary 4–5-ovuled.—Root creeping; stems 3′–1° high; radical leaves often oval or oblong; flowers ochroleucous, rarely purple, frequently deflexed in fruit. Oregon and Northern California to Colorado and Northern Arizona, (Ives.) Found in the Havallah range, Nevada, and in the Wahsatch and Uintas; 6–9,000 feet altitude; June–August. (238.)

TRIFOLIUM SUBCAULESCENS, Gray. *Bot. Ives's Rep., p.* 10. Cæspitose, dwarf, hoary-pubescent or subglabrous; stipules ovate, dentate or subentire; leaflets obovate or oblong, rather rigid, striate-veined, denticulate, usually mucronate and sometimes retuse; peduncles not exceeding the radical petioles; head naked, many-flowered; teeth of the villous calyx lanceolate-subulate or almost setaceous, more or less exceeding the tube, usually half-shorter than the white corolla.—Stems 2–3′ high, the radical stipules subscarious; leaflets 3–12″ long, glabrous above; corolla 4–6″ long. Much resembling *T. longipes* but for its dwarf habit and broader and less acuminate leaflets. Collected by Ives, near Fort Defiance, in Northeastern Arizona, and in the past season by Dr. Palmer at St. George in Southern Utah.

TRIFOLIUM KINGII. Glabrous throughout; stems few, erect, 6–10′ high; stipules foliaceous, small, lanceolate, acuminate, entire; radical leaves rather long-petioled, the cauline on short petioles but little exceeding the stipules; earlier leaflets ½′ long, round-ovate, obtuse, the later 1½′ long, oblong or narrow-lanceolate, very acute, all striate-veined and sharply denticulate; peduncles exceeding the leaves; heads naked, many-flowered, the purplish flowers at length reflexed; calyx-teeth setaceous-subulate, equaling or somewhat exceeding the campanulate tube, about one-third the length of the (4–5″ long) corolla.—Found growing sparingly in a damp cañon above Parley's Park in the Wahsatch; 6,500 feet altitude; June. (239.)

TRIFOLIUM NANUM, Torr. Glabrous, cæspitose; caudex short and thick, branching; leaflets ovate-oblong, acuminate, denticulate, strongly veined;

stipules membranous, ovate, cuspidate; peduncles very short, radical, umbellately about 3-flowered; flowers large; calyx campanulate, teeth nearly equal, triangular-subulate, shorter than the tube; vexillum broadly obovate, thrice the length of the calyx; legume 4–5-seeded.—Alpine, 1–2′ high; flowers $\frac{3}{4}$′ long, scarcely unfolding. Rocky Mountains of Colorado Uinta Mountains, Utah; 12,000 feet altitude; August. (240.)

TRIFOLIUM DASYPHYLLUM, T. & G. Cæspitose, more or less canescently silky; caudex short and thick, branching; leaflets linear or oblong-lanceolate, acute, entire; stipules membranous, subulate-acuminate; head globose, on a long radical peduncle, bracteate; bracts lanceolate, scarious-margined, unequal; calyx-teeth setaceous, nearly equal, exceeding the tube, a little shorter than the purple corolla; legume 3–4-seeded.—Alpine; peduncles 2–4′ high, twice longer than the leaves; corolla 4–6″ long, scarcely unfolding. Rocky Mountains of Colorado. Uinta Mountains, Utah; 11–12,000 feet altitude; August. (241.)

TRIFOLIUM ANDINUM, Nutt. Cæspitose, silky-canescent; caudex short and thick, branching; leaflets rigid, cuneate-oblong, acute or acuminate, entire, strongly veined, (3–5″ long;) stipules broadly ovate, membranous, obtuse, glabrous, ciliate; peduncles radical, (1–2′ high,) about equaling the leaves; heads hemispherical, rather few-flowered, sessile between two opposite broadly stipuled trifoliolate bracts; calyx densely silky-villous with white hairs; teeth setaceous, longer than the tube, but shorter than the persistent (3–4′ long) corolla; ovary 3–4-ovuled; legume ovate, 1-seeded.—Corolla 3–4″ long, persistent. Summit of Cedar Mountain near Evanston, Utah; 7,000 feet altitude; in fruit, July. Collected by Nuttall in the Rocky Mountains, probably in the same region. PLATE VIII. Fig. 3. A plant; natural size. Fig. 4. The involucral bracts. Fig. 5. The calyx, expanded. Fig. 6. A matured capsule; all enlarged two diameters. (242.)

TRIFOLIUM ANDERSONII, Gray. *Proc. Amer. Acad.* 6. 522. Low, cæspitose, very villous throughout with white silky hairs; the branched caudex thick, woody, covered with rather large scarious stipules; leaflets 4–6, ($\frac{1}{2}$′ long,) oblong or obovate-cuneate, mucronate, entire; peduncles (1$\frac{1}{2}$–2′ long) equaling the leaves; head globose, many-flowered; flowers sessile; calyx-teeth subulate-setaceous, rather longer than the campanulate tube; corolla pink, ($\frac{1}{2}$′ long,) not scarious; ovary 5-ovuled; legume globular, 1–2-seeded. Mountains near Carson City; discovered by Dr. Anderson.

TRIFOLIUM PARRYI, Gray. *Amer. Jour. Sci.* (*n. s.*) 33. 409. Glabrous, subcaulescent; scape 3–4′ high, leafy and decumbent at base; stipules ovate, more or less scarious; leaflets oblong, (½–1½′ long,) sharply dentate; involucre scarious, 5–7-parted, much shorter than the many-flowered head; segments ovate, obtuse; calyx about thrice shorter than the persistent closed purple (6–9″ long) corolla, the teeth broadly subulate, about equaling the campanulate tube; legume sessile, 3–4-seeded.—In moist grassy subalpine cañons. Rocky Mountains of Colorado. Near head of Bear River, Uinta Mountains, Utah; 9,000 feet altitude; August. (243.)

TRIFOLIUM MICROCEPHALUM, Pursh. Annual, hairy; stems (½–2° long) ascending or procumbent, branched; leaflets obcordate or cuneate-obovate, and often emarginate, denticulate; stipules ovate, acuminate, nearly entire; heads small, subglobose, on long axillary peduncles; involucre many-cleft, the segments (about 9) equal, entire; flowers in 2–4 verticels; calyx-teeth equal, straight, subulate, about equaling the tube and corolla; legume 1-seeded, indehiscent. From Washington Territory to Southern California. Havallah Range, near Cumberland, Nevada; 6,000 feet altitude; June. (244.)

TRIFOLIUM VARIEGATUM, Nutt. Annual, glabrous, decumbent or suberect, branching; stems slender, (½–1° long,) leaflets (3–6″ long) oblong, obovate, or somewhat obcordate, minutely spinulose-serrate; stipules lanceolate or ovate, gashed-dentate with setaceous teeth; peduncles axillary, exceeding the leaves; involucre many-cleft, (somewhat 6-lobed, the segments subulately toothed:) calyx-teeth equal, setaceous-subulate, longer than the tube, a little shorter than the purple or white (3″) corolla; legumes 1–2-seeded. Oregon, California, and Sonora, (Thurber.) In the Truckee Valley, near Cumberland City in the Havallah Range, and in Ruby Valley, Nevada; 5–6,000 feet altitude; June–August. (245.)

TRIFOLIUM FIMBRIATUM, Lindl. Biennial, glabrous, stems ascending, (6–18′ high;) leaflets lanceolate, oblong or obovate, acute or the lower retuse, spinulose-denticulate; stipules ovate, acuminate, laciniate-spinulose; involucre many-cleft, shorter than the many-flowered subglobose heads; calyx-teeth subulate, straight, half the length of the corolla and about equaling the tube, usually entire; legume 2–6-seeded.—Leaflets ¼–1′ long or more; heads of purple or whitish flowers ½–1′ in diameter. A pubescent form is *T. obtusiflorum*, Hook. Oregon and California; frequent. Truckee Valley, Toyabe

Mountains, and Ruby Valley, Nevada; 5–6,000 feet altitude; July. One of the most valuable of the western species. (246.)

TRIFOLIUM CYATHIFERUM, Lindl. Annual, glabrous; stems ascending, (6–18′ long,) branched at base; leaflets oblong and obovate, cuneate, mucronate, spinulose-serrate; stipules somewhat scarious, ovate, laciniate-toothed; peduncles long; involucre large, (6–8″ in diameter,) cyathiform, the border obtusely many-toothed, somewhat shorter than the few- or many-flowered heads; calyx oblong, subinflated, membranous, with teeth setaceously 3–many-parted, equaling the corolla; legume 2-seeded.—Oregon, (Douglas and Geyer,) and in the Rocky Mountains, (Nuttall.) Found in the Truckee Valley and on stream banks in the Havallah and East Humboldt Mountains, Nevada; 5–6,000 feet altitude; June, July. (247.)

TRIFOLIUM GYMNOCARPON, Nutt. Perennial, cæspitose, (2–4′ high,) minutely pubescent or hairy; caudex short and thick, many-branched; leaves radical, on long petioles, exceeding the peduncles; leaflets (3–6″ in length) oval-oblong, obtuse or acute, serrate; stipules scarious, oval; heads 2–6-flowered, not involucrate; flowers on short pedicels; calyx-teeth subulate, equaling the subcampanulate tube and half the length of the corolla; legume coriaceous, globose, (2–3″ long,) hairy, 1–2-seeded, upon a stipe about equaling the calyx-tube, dehiscent.—Collected only by Nuttall near the sources of the Sweetwater, in Wyoming Territory. Found growing under sage-brush on the foot-hills of Parley's Park in the Wahsatch; 6,500 feet altitude; June. PLATE VIII. Fig. 1. An entire plant; natural size. Fig. 2. Matured legumes; enlarged two diameters. (248.)

HOSACKIA ARGOPHYLLA, Gray. *Synopsis of Hosackia, Proc. Acad. Phil.*, 1863, *p.* 347. Perennial, somewhat shrubby or nearly herbaceous, densely silky-tomentose, the long and rather silky branches decumbent; leaflets 3–5, obovate, obtuse, 3–6″ long, the common petiole and rachis very short; umbels 8–12-flowered, with a simple bract, capitate, the peduncle short or occasionally exceeding the leaf; calyx-teeth slender, about half as long as the cylindrical tube; flowers 4–5″ long, yellow or becoming reddish, the broad incurved apex of the keel obtuse; legume small, attenute above, incurved, 1–4-seeded. Southern and Middle California.—Var. (?) FREMONTI, Gray. Leaflets obovate-oblong, acute; flowers 5″ long; calyx-teeth setaceous, nearly equaling the tube. Found east of the Sierras by Frémont, probably in Nevada.

Hosackia Heermanni, Dur. & Hilg. *Gray's Syn., l. c., p.* 348. Perennial, finely villous-pubescent, diffusely much branched, very leafy; leaflets 3–5, obovate, roundish, or oval-oblong, 2–5″ long, upon a short petiole; umbels numerous, 4–9-flowered, with a simple bract, the peduncle often equaling the leaf; teeth of the loosely villous calyx considerably shorter than the campanulate tube; flowers 2′ long, yellow turning purplish, the keel with a broad and very obtuse summit; legume pubescent, the body but little exceeding the calyx, with a subulate incurved beak, 1–2-seeded. Southern California, and also collected by Dr. Anderson near Carson City, Nevada.

Hosackia Purshiana, Benth. *Gray's Syn., p.* 352. Annual, erect or ascending, much branched, pubescent or softly villous, sometimes glabrous; leaves nearly sessile; leaflets 3, (or 1, rarely 4,) varying from ovate to lanceolate, rather acute; stipules minute, blackish; peduncles exceeding the leaves, 1-flowered; bract simple; corolla scarcely longer than the deeply cleft calyx; keel attenuated upward, falcate; vexillum on a short claw approximating the others; legume linear, straight, not attenuate above.—Stem 6′–2° high; branches usually distichous. In North Carolina, and from Arkansas to the Upper Missouri and westward, in Oregon, California and Sonora. Found on the banks of the Truckee River, Nevada; July, August. (249.)

Hosackia subpinnata, T. & G. *Gray's Syn., l. c., p.* 352. Annual, procumbent, (3–6′ high,) branched from the base, villous-hirsute or glabrate; leaflets 3–5, obovate, obtuse, ⅓′ long; lower ones scattered on the dilated rachis; stipules minute; flowers small, yellow, solitary, subsessile, ebracteate; calyx-teeth about equaling the tube, shorter than the corolla; keel rostrate, falcate; the short claw of the banner not distant from the others; legume linear-oblong, straight, subcompressed, not rostrately attenuate, 4–7-seeded, much exceeding the calyx. California and Oregon. Collected by Stretch in Western Nevada.

Psoralea lanceolata, Pursh. Nearly glabrous, with a few scattered hairs and numerous dark-colored glands; erect, 1° high, much branched; leaves palmately 3-foliolate; leaflets (½–1′ long) linear-lanceolate or cuneate-obovate, acute or obtuse, or the lower retuse, mucronate, shortly petiolulate; peduncles longer than the leaves; racemes short, 6–15-flowered; calyx-teeth minute, obtuse, hairy; corolla 3″ long, light blue; legume globose, hirsute.—From the Platte to the Saskatchewan and west to the Rocky Mountains; Oregon, (Douglas;) Northern Arizona, (Ives.) Found at the foot of the Pah-Ute

Range, Nevada, in Salt Lake Valley, and on Antelope Island, Utah; 5,000 feet altitude; June. (250.)

DALEA POLYDENIA, Torr. MSS. "Stem shrubby with numerous divaricate branches, clothed with a minute appressed whitish retrorse pubescence, and sprinkled with conspicuous elevated reddish glands; leaflets 11–13, orbicular-obovate, somewhat retuse, hoary-pubescent both sides, sparingly glandular underneath; flowers in dense oblong spikes; teeth of the villous calyx subulate, about as long as the tube.—A bushy plant 2–5° high, leaflets 2″ long, thick and somewhat rigid; spikes ¾′ long; flowers pale purple; petals mostly with an orange gland at the tip." Border of Truckee Desert, Nevada; (W. W. Bailey;) 4,200 feet altitude; July, in flower and fruit; nearly leafless early in May. First collected by Dr. Torrey near Carson Desert. PLATE IX. Fig. 1. Portion of a branch; natural size. Fig. 2. A single flower, and its parts. Fig. 6. A nearly mature capsule; all enlarged three diameters. (251.)

DALEA KINGII. Suffrutescent-branched, glandular-punctate, somewhat silky-pubescent; branches flexuose, leafy; lateral branchlets short, (1′ in length,) spinose, nearly naked; leaves pinnate, 3–9-foliolate; leaflets oval or oblong, (3–6″ long,) obtuse; stipules small, setaceous; flowers solitary on the branchlets, nearly sessile; calyx-teeth equaling the campanulate obscurely 10-ribbed tube, acute, the upper broadly triangular, the lower lanceolate; petals bright blue, equal, nearly free; the vexillum orbicular, emarginate; stamens 9 or 10; style hairy; ovules not collateral; pod oblong, (2½″ long,) pubescent.—Plant 1° high, much branched, yellowish-green throughout; glands greenish, rather obscure; corolla 3–4″ long; near *D. Frémontii.* Found on drifted sands in the upper cañons of the Hot Spring Mountains, Nevada; 7,000 feet altitude; August. PLATE X. Fig. 1. The extremity of a branch; natural size. Fig. 2. The parts of a flower. Fig. 3. A mature legume; all magnified two diameters. (252.)

DALEA JOHNSONI. A diffusely branched shrub, with smooth gray sparingly glandular bark, the branches subspinescent at the extremities; leaves 1–2′ long, with the branchlets appressed grayish-pubescent, petioled; leaflets 5–11, narrowly oblong or oblanceolate, 3–6″ long, acute or obtuse, with rather obscure greenish glands; flowers in loose (1–3′ long) racemes terminating the leafy branchlets, on very short (½–1″ long) peduncles, deflexed-secund, bracteate with 1–4 small subulate caducous bractlets; calyx

obconic-campanulate, 10-ribbed, the teeth triangular, acuminate, unequal, about as long as the tube; petals deep-purple, 4–5″ long, nearly as in the last; ovules collateral; pod 4–6″ long, covered with yellow resinous glands; seed 3″ in diameter.—Very near the following species but apparently distinct. Collected by J. E. Johnson near St. George on the Virgin River, Utah, and also in the same locality by Dr. Palmer, 1870.

Dalea Frémontii, Torr. *Plant. Thurber., p.* 316. A much-branched shrub, sparingly glandular-punctate, silky puberulent; leaves petioled, simple and obovate-spatulate, or more frequently 3-foliolate with obovate leaflets, 3″ long, shorter than the petiole; flowers sessile upon the subspinescent branchlets, loosely spiked, spreading, bracteate with a leaf or usually with a small subulate bractlet, the rachis with a few minute bristles; calyx-teeth very acute, the upper triangular, the lower subulate, about equaling the campanulate scarcely ribbed tube; corolla reddish-purple, 4–5″ long, the obcordate banner and wings equaling the keel; ovules not collateral; pod 4–6″ long, 3″ broad.—Found by Frémont on rocks in Southern Nevada. Material scanty.

Astragalus diphysus, Gray. *Revis. Astrag., Proc. Amer. Acad.* 6. 193. Nearly glabrous; stems 1–2° long, numerous, decumbent or ascending; stipules triangular, acuminate, scarious, adnate to the petiole; leaflets 6–11 pairs, obovate or oblong, usually obtuse or retuse; peduncles equaling the leaves; racemes short, rather densely flowered; calyx-tube long-campanulate, twice longer than the subulate teeth; corolla 6″ in length, blue or purple, occasionally white; legume 1′ long, ovate, membranous, inflated, 2-celled, with a perfect septum, curved-acuminate, many-seeded, sessile; frequently mottled.—New Mexico, Northern Arizona, and Utah. Toyabe and East Humboldt Mountains, Nevada; 6–8,000 feet altitude; July. This species may possibly be but a luxuriant, glabrous form of the next, into which it seems to pass. (253.)

Astragalus lentiginosus Dougl. *Gray's Revis., l. c., p.* 194. More or less hoary appressed pubescent; stems 4–15′ long, decumbent or ascending; stipules small, acuminate; leaflets 6–11 pairs, obovate, obtuse or retuse; racemes short or elongated, rather densely or loosely flowered; calyx-tube campanulate, scarcely longer than the teeth; corolla purple or ochroleucous, 3–6″ long; legume as in the last, ½–1′ long, slightly puberulent, arcuately

incurved.—Evidently a quite variable species, including not only possibly the last species and, certainly, *A. ineptus*, Gray, but also *A. Frémontii*, T. & G., and more doubtfully *A. Coulteri*, Benth., (=*A. Arthu-Schottii*, Gray.) The flowers and fruit in all are essentially identical, but the legume of the last species is more densely pubescent and more coriaceous. The Var. *floribundus*, Gray, is the ordinary well-developed form. Reported from the interior of Oregon and Washington Territory, and from Nevada, (Anderson.) Frequent in Western Nevada; 5–8,000 feet altitude; May–June. (254.)

Var. Fremontii. (*A. Fremontii*, T. & G., *Gray's Rev.*, *l. c.*, 194.) More or less hoary with appressed hairs; stems often somewhat flexuous; stipules very small; flowers smaller and in rather loose spikes, ochroleucous or tipped with purple; legume usually smaller and somewhat hirsute.—In the immature pod the septum is often incomplete; a low starved form, confined to the valleys. Collected by Frémont in Northern Arizona, and by Cooper at Fort Mohave. Frequent in Nevada from the valley of the Truckee to Reese River. *A. Coulteri*, Benth., an older species from Southern California and Arizona, may be a still more hoary-pubescent form, with a rather small and more chartaceous legume. (255.)

Astragalus platytropis, Gray. *Proc. Amer. Acad.*, 6. 526. Dwarf (2–3′ high) and alpine, scarcely caulescent, rhizomas elongated and much branched, silvery-sericeous; stipules ovate, acuminate; leaflets 3–6 pairs, 3–4″ long, obovate; peduncles scapelike, equaling the leaves, capitately few-flowered; calyx-teeth subulate, a little shorter than the campanulate tube; corolla 3″ long, ochroleucous, with the broad rounded keel tipped with purple and equaling the other petals; legume as in the preceding, globose-ovate, ¾–1′ in length.—Above Sonora Pass in the Sierra Nevadas, (Brewer.) East Humboldt Mountains, Nevada; 11,000 feet altitude; July, August. (256.)

Astragalus calycosus, Torr. MSS. Perennial, with a short thick much-branched caudex, nearly acaulescent, silvery-sericeous; leaflets 1–3 (rarely 5) pairs, oblong or ovate, 1–4″ long, usually acute; peduncles radical, a little exceeding the leaves, 1–2′ long, 2–6-flowered; flowers ½′ long, ochroleucous, with the very obtuse rounded keel purple-tipped and much shorter than the vexillum and the 2-lobed wings; the campanulate calyx-tube exceeding the acuminate or triangular teeth; legume sessile, minutely

pubescent, chartaceous, oblong (4″ long,) straight, subcompressed, slightly sulcate dorsally, 2-celled, many-ovuled, about 10-seeded.—Cæspitose and subalpine; leaves occasionally palmately 3-foliolate; legume 2-celled, though the septum appears incomplete in immature pods. Found in the West Humboldt, East Humboldt, and Clover Mountains, Nevada; 8–11,000 feet altitude; June–September; also collected by Dr. Torrey, in flower only, in Western Nevada. PLATE X. Fig. 4. A single stem; natural size. Fig. 5. A dissected flower. Fig. 6. A mature legume. Fig. 7. Cross-section of the same; all enlarged two diameters. (257.)

ASTRAGALUS ANDERSONII, Gray. *Proc. Amer. Acad.*, 6. 524. Perennial, canescent with a very soft subvillous pubescence; stems 1° high, ascending; stipules triangular-lanceolate, adnate to the petiole; leaflets 7–12 pairs, 3-5″ long, oval or oblong, rarely obovate; peduncles exceeding the leaves; spikes short, densely many-flowered; calyx-teeth setaceous, about equaling the campanulate tube, half shorter than the ochroleucous (½′ long) corolla; legume ¾–1′ long, chartaceous, oblong-linear, arcuately incurved, subcompressed, completely 2-celled, sessile, deflexed, 12–20-seeded.—Near Carson City, Nevada, (Anderson.) Found in the same region near Washoe City; 5,000 feet altitude; May. (258.)

ASTRAGALUS MALACUS, Gray. *Proc. Amer. Acad.*, 7. 336. Perennial, villous with rather rigid white hairs; stems subdecumbent, ½–2° long; stipules large, scarious, triangular, acuminate, adnate to the petiole; leaflets 6–8 pairs, 3–8″ long, obovate, retuse; peduncles exceeding the leaves; racemes short, many-flowered, lengthening in fruit; the cylindrical calyx-tube often dark-villous, 2-3 times longer than the setaceous-subulate teeth; corolla usually deep-purple, 6–9″ in length; legume oblong-lanceolate, 1′ long, 3–4″ broad, arcuately incurved, sessile, deflexed, somewhat densely villous, chartaceous, subcompressed, with a shallow dorsal sulcus, 2-celled, acutely margined ventrally, many-seeded.—Collected near Carson City, by Dr. Anderson, and frequent in the Virginia and Trinity Mountains, Nevada; 5,000 feet altitude; April, May. (259.)

ASTRAGALUS CANADENSIS, L. From the mountains of Georgia to Northern New York, Canada and the Saskatchewan, and west to the Indian Territory; collected also on the head-waters of the Columbia by Douglas. Found in the Wahsatch Mountains, (Provo Cañon,) Utah; 6,000 feet altitude; July. (260.)

Var. Mortoni. (*A. Mortoni*, Nutt. *Gray's Rev.*, *l. c.*, 196.) Differing from the last only in the somewhat pubescent ovary and legume; compared, however, with Wisconsin specimens of *Canadensis*, the legumes are of somewhat less diameter, more decidedly sulcate dorsally, and less crowded in the matured spike. Collected by Nuttall on the head-waters of the Missouri and Platte, and by Brewer in California. In the Truckee Valley and the Toyabe and East Humboldt Mountains, Nevada, and Bear River Valley, Utah; 5–8,000 feet altitude; July, August. (261.)

Astragalus adsurgens, Pall. *Gray's Rev.*, *l. c.*, 197. Perennial, cinereous with minute appressed pubescence or glabrate; stems rather stout, 4–18′ high, ascending or decumbent; stipules scarious, mostly united at base; leaflets 10 pairs, 6–9″ long, narrowly or linear-oblong; spike dense, at length oblong or cylindrical; flowers purplish, medium sized, ascending; calyx-tube rather long-campanulate, twice exceeding the setaceous teeth, subvillous with light or dark hairs; pod coriaceous, pubescent, sessile, ascending, ovate-oblong (4–5″ in length,) straight, usually triangular-compressed, with a dorsal sulcus, and 2-celled by the intruded dorsal suture, many-ovuled.—From Nebraska to Oregon and the Saskatchewan. Flowering specimens, probably of this species, were collected by Stretch in Pleasant Valley, Nevada.

Astragalus hypoglottis, L. *Gray's Rev.*, *l. c.*, 197. Perennial, with a rather loose pubescence or nearly glabrous; stems 6′–2° long, slender, diffusely procumbent or ascending; stipules subfoliaceous and more or less sheathing; leaflets 7–10 pairs, oblong, obtuse or retuse; heads rather many flowered; corolla violet ½′ long; legume as in the last, but ovate and triangular, silky-villous, very shortly stipitate, and but 6–8-seeded.—From Southern Colorado (Moro River, Fendler,) northward along the Rocky Mountains and Red River Valley to the Arctic Circle and Alaska. In the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; June–September. (262.)

Astragalus Nuttallianus, DC. *Gray's Rev.*, *l. c.*, 199. Annual, stems ascending or erect, 3–18′ high, minutely pubescent; leaflets 5–7 pairs, elliptical or oblong, obtuse or retuse; flowers few, subcapitate or sometimes solitary, on slender peduncles, light purple, small (2″ long,) the keel much shorter than the banner, with the apex incurved; legume coriaceous, linear, subcompressed, incurved near the base, sulcate dorsally, 2-celled, many-

ASTRAGALUS ATRATUS.

ovuled, sessile, reticulated.—Arkansas and Texas to Arizona and Sonora. Var. TRICHOCARPUS, T. & G. With hispid calyx and slightly hairy legumes; stems 3′ high. Found on Stansbury Island, Salt Lake; June. (263.)

ASTRAGALUS ARRECTUS, Gray. *Proc. Amer. Acad.* 8. 289. Perennial, somewhat cinereous-pubescent or nearly glabrous; stems 1–2° high, erect, sulcate, simple or branched; stipules distinct, scarious; leaflets 9–12 pairs, 6–8″ long, ovate or narrowly oblong, obtuse or retuse; racemes on long peduncles, loosely rather few-flowered; flowers ochroleucous, 7″ long, twice exceeding the tubular-campanulate nigrescent calyx; calyx-teeth rather short and slender, but variable; pod erect upon a spreading or somewhat deflexed pedicel, coriaceous, subglabrous, oblong (¾–1′ long,) nearly straight, cuspidate, abruptly narrowed at base into a stipe as long as the calyx, with a deep dorsal sulcus and somewhat carinate ventrally, 2-celled, many-seeded.—This is 378 (*A. leucophyllus, ?*) of Geyer's collection, from Oregon, and is nearest *A. Drummondii.* Foot-hills about Summit Springs, near Battle Mountain, Nevada; 5,500 feet altitude; June. (264.)

ASTRAGALUS ATRATUS. Perennial, somewhat canescent with a minute appressed pubescence; stems 6′–1° high, numerous, slender, ascending; stipules small, triangular, somewhat adnate to the petiole; leaflets 4–7 pairs, linear or oblong, 2–5″ long, obtuse or acute; peduncles exceeding the leaves; racemes loose or capitate, few- (5–10-) flowered; calyx-tube campanulate, nigrescent, twice longer than the acute teeth; corolla ½′ long, ochroleucous or somewhat tinged with violet; banner emarginate and with the 2-lobed wings much exceeding the strongly arched keel; legume 10″ long, short-stipitate, chartaceous, minutely pubescent or nearly glabrous, linear, straight, terete, with a narrow dorsal sulcus and nearly 2-celled, many- (15–20-) ovuled, more or less pendent.—With the habit of *A. oroboides* and *alpinus.* Found on the Pah-Ute, Havallah, and Toyabe ranges, Nevada; 6–7,000 feet altitude; June, July. PLATE XI. Fig. 1. Plant; natural size. Fig. 2. Petals. Fig. 3. Stamens and ovary; both enlarged two diameters. Fig. 4. Mature legume. Fig. 5. Cross-section of same. (265.)

ASTRAGALUS OBSCURUS. Very closely resembling the last, but differing in the erect sessile 10–15-ovuled legume, and in the flowers, which have the keel less strongly arched, with the apex ascending, equaling the entire wings, but shorter than the orbicular banner. Found on rocky foot-hills near Truckee Pass, Nevada; 5,500 feet altitude; May. (266.)

Astragalus aboriginum, Rich. *Gray's Rev., l. c.*, 203. Perennial, hoary pubescent or subvillous; stems numerous, rigid, ascending, $\frac{1}{2}$–1° high; stipules triangular, for the most part free; leaflets 3–6 pairs, linear or oblong-lanceolate, acute; peduncles exceeding the leaves; flowers small (3–5″ long,) in a compact raceme, white or tinged with violet; calyx-teeth filiform-subulate, a little shorter than the tube; legume long-stipitate, reflexed, somewhat membranous, glabrous, laterally subcompressed, (cross-section oval,) straight dorsally, the ventral suture arcuate, 1-celled with a very narrow rudimentary septum on the dorsal side, 10–15-ovuled.—From Lake Winnipeg to Bear Lake and Behring Strait, and in the Rocky Mountains of Colorado. East Humboldt Mountains, Nevada; 11,000 feet altitude; August. (267.)

Astragalus Robbinsii, Gray. Var. (?) occidentalis. A puzzling form, intermediate between *A. Robbinsii* and *oroboides*, but nearer the former. The legume (not yet mature) is much compressed, straight on the dorsal side and arcuate ventrally, tapering at base to a very short stipe, with no indication of a dorsal sulcus, but with a narrow rudimentary dorsal septum, pubescent with more or less nigrescent hairs. The flowers are rather larger than in *Robbinsii*, the wing usually emarginate, but less deeply so. East Humboldt Mountains, Nevada; 10,000 feet altitude; August. Apparently the same plant, but with less mature legume, was collected by Bourgeau (*Phaca* 2) in the Rocky Mountains. (268.)

Astragalus iodanthus. Perennial, canescent with an appressed hairy pubescence, or usually nearly glabrous with scattered hairs upon the petioles and margins of the leaves; stems decumbent, 6′–10′ long; stipules ovate-lanceolate, free or somewhat adnate to the petiole; leaflets 6–10 pairs, 2–5″ long, obovate or orbicular, obtuse; peduncles equaling the leaves; spikes short, dense; flowers on short pedicels, deep violet-purple or ochroleucous tinged with purple, the wings and banner (6–8″ long) exceeding the obtuse keel, the somewhat nigrescent campanulate calyx-tube twice longer than the subulate teeth; legume 1$\frac{1}{2}$′ long, 3″ broad, linear-oblong, acuminate, strongly arcuate or hamate, sessile, nearly glabrous with a very sparse pubescence, mottled, chartaceous, irregularly folded but usually with a deep dorsal sulcus approximating the suture to the prominent ventral one, dorsal septum none, many-seeded.—Collected by Dr. Bloomer and Dr. Torrey near Virginia City, and not rare on the foot-hills of Western Nevada from the Virginia to the

West Humboldt Mountains; 4,500–6,000 feet altitude; April -June. Closely related to both *A. Parryi* and *A. Beckwithii.* (269.)

An interesting form occurs with the legumes more coriaceous, less arcuate, not mottled, and irregular in the intrusion of the dorsal suture, becoming at times essentially the same as the legume of *A. Beckwithii.* The variation is so great as to show that too much reliance must not be placed on the form of the legume in determining the species of this section. Near Salt Lake City and on Antelope Island, Utah; May, June. (270.)

ASTRAGALUS BECKWITHII, T. & G. *Gray's Rev., l. c.*, 221. Perennial, glabrous or nearly so; stems 1–2° long, diffusely spreading; stipules ovate-lanceolate, adnate to the petioles; leaflets 6–12 pairs, 6′ long, broadly oval; flowers (5–8) in a short loose raceme, ochroleucous, 9″ long; calyx-teeth subulate, scarcely shorter than or exceeding the nearly glabrous campanulate tube; legume 1′ long, glabrous, transversely rugulose, coriaceous, short-stipitate, somewhat obcompressed, flattened dorsally with the suture slightly intruded, bisulcate ventrally with the prominent suture acutely margined, many-seeded.—Salt Lake Valley. Found in Ruby Valley, Nevada, and on Antelope Island, Salt Lake; June, July. (271.)

ASTRAGALUS PTEROCARPUS. Perennial, somewhat hoary with a minute pubescence; stems 1–2° long, decumbent, branched; leaflets 1′ long, 2–4 pairs, distant, linear; peduncles longer than the leaves; racemes short and rather few-flowered; legume 1–1½′ long, ½′ wide, coriaceous, glabrous, sessile, strongly obcompressed (compressed at the apex,) ovate, acute, laterally winged, rugose-veined transversly, slightly sulcate dorsally, the dorsal suture nearly meeting the somewhat depressed ventral one, many-seeded.—A well-marked species, remarkable for its broad obcompressed legumes, which are margined their whole length with an entire wing a line in breadth; flowers ½′ long; collected only in fruit. Growing in alkaline soil near the junction of Reese River with the Humboldt, Nevada; June. PLATE XII. Fig. 1. A stem; natural size. Fig 2. Section of the legume; enlarged two diameters. (272.)

ASTRAGALUS ERIOCARPUS. Perennial, canescent with a dense subappressed hirsute-silky pubescence, acaulescent; leaflets 4–7 pairs, 4–6″ long, obovate, somewhat acute or often retuse; the scape-like curved peduncles (2–6′ long) equaling the leaves; flowers (3–6) loosely capitate, large (1′ long,) deep-purple, twice longer than the cylindrical calyx; calyx-teeth subulate-

setaceous, one-third as long as the tube; keel elongated, nearly straight, slightly arched at the apex, a little shorter than the wings and banner; legume 1–1¼′ long, firmly coriaceous, sessile, densely silky-hirsute, transversely rugose, oblong-lanceolate, arcuate, obcompressed with approaching sutures at the base, but becoming compressed with prominent sutures towards the apex, 1-celled, many-seeded.—Found on the foot-hills of the Trinity and of the East and West Humboldt Mountains, Nevada; 5–6,000 feet altitude; April–July. With exactly the habit of *A. Shortianus* and also near to *glareosus*, but distinguished from both by the very hirsute legume. The pubescence is less straight and silky than in *Shortianus*, and on the other hand less woolly than in *Purshii* and *Utahensis*. (273.)

Astragalus Purshii, Dougl. *Gray's Rev.*, *l. c.*, 212. Nearly acaulescent (rarely 6′ high,) canescent with a long and dense woolly pubescence; peduncles short (2–3 high;) leaflets 5–8 pairs, lanceolate or oblong, 3–5″ long; flowers ¾–1′ long, ochroleucous, with the keel sometimes purplish; legume as in the last, but usually smaller, (¾′ long,) less arcuate, and with a more woolly pubescence.—From Green River in Wyoming Territory west to the mountains of California and Central Oregon. Frequent in Nevada from the Washoe to the East Humboldt Mountains; 5–7,000 feet altitude; April–July. (274.)

Astragalus Utahensis, T. & G. *Gray's Rev.*, *l. c.*, 213. Very near to the last, from which it differs in being subcaulescent with the short stems (2–6′ long) prostrate, in its suborbicular leaves, (2–4″ in diameter,) in its usually dark-purple flowers, and in its softer and more dense appressed woolly pubescence. Reported only from the shores of Salt Lake, but found in the Virginia and East Humboldt Mountains, Nevada, as well as on Antelope Island and in the Wahsatch; 4,500–6,000 feet altitude; May–August. (275.)

Astragalus Geyeri, Gray; *l. c.*, 214. Annual, low, (3–6′ high,) somewhat simple, subcanescent, with an appressed hairy pubescence; leaflets linear or oblong, obtuse, glabrous above; peduncles shorter than the leaves, few-(3–5-)flowered; corolla 3″ long, ochroleucous; calyx-teeth subulate, about equaling the short campanulate tube; legume 8–9″ long, membranous, inflated, ovate-lunate with an incurved acumination, sessile, not mottled, finely reticulated, glabrous, 1-celled.—Collected by Geyer on the Upper Platte; also by Douglas and Gordon. Found on the foot-hills of the Trinity

Mountains, and on sand dunes at Cooper's Ferry, near Humboldt Lake, Nevada; May. (276.)

ASTRAGALUS HOOKERIANUS, Gray; *l. c.*, 215. Perennial, silky-pubescent; stems low, (2–4′,) ascending, flexuous; stipules lanceolate, lower ones membranous and sheathing; leaflets 6–9 pairs, 2–3″ long, oblong or linear-oblong, or orbicular; spikes short, few-flowered; corolla ochroleucous, 4–5″ long; calyx-tube campanulate, the teeth short; legume 1–2′ long, membranous, inflated, oblong-obovate, rounded at the apex, attenuate at base into a short stipe, mottled, glabrous, 1-celled.—Collected only by Douglas in the "interior of Oregon," and by Anderson (273) in the West Humboldt Mountains, probably on Star Peak, where it grows in the crevices of limestone rocks at an elevation of 10,000 feet; in flower and fruit, September. A dwarf species of very distinct habit, and easily distinguished by its large obtuse legume. (277.)

ASTRAGALUS OOPHORUS. Perennial, glabrous throughout; stems 1–2° long, numerous, subdecumbent; stipules ovate-acuminate, nearly free; leaflets 4–6 pairs, 6 9″ long, ovate-oblong, obtuse; racemes short, loosely few-(6–10-) flowered; flowers ½′ long, ochroleucous or tinged with violet, spreading; calyx-teeth setaceous, equaling the campanulate tube; legume 2′ long, membranous, inflated, ovate, (the sutures equally arched,) acuminate, upon a stipe equaling the calyx, reflexed, mottled, glabrous, 1-celled.—Near *A. curtipes*, Gray. Reese River Pass of the Shoshone Mountains, Nevada; 5,500 feet altitude; July. (278.)

ASTRAGALUS JEJUNUS. Perennial, dwarf, minutely hoary-pubescent; stems short (1–2′ long) and crowded, from a many-branching caudex, covered with numerous imbricated stipules, which are membranous, sheathing, truncate and ciliate; leaflets 4–7 pairs, linear, 1–2″ long; peduncles shorter than the leaves, 2–3-flowered; corolla ochroleucous or tinged with violet, 2″ long; calyx-teeth a little shorter than the campanulate tube; legume 4″ long, membranous, inflated, globose, obtuse, sessile, glabrous, wholly 1-celled.—An insignificant species with a starved desert habit, but remarkable for its singularly stipuled stems and obtuse legumes; growing on the foot-hills of Bear River Valley, near Evanston, Utah. PLATE XIII. Fig. 1. A stem; natural size. Figs. 2–5. Parts of the flower; enlarged four diameters. Fig. 6. Mature legume, opened; enlarged two diameters. (279.)

Astragalus nudus. Perennial, somewhat hoary with a minute pubescence; stems numerous, ascending, branched, flexuous; stipules ovate-acuminate, the lower ones adnate to the petioles; leaflets ½–1′ long, 1–2 pairs, linear, distant upon a long (4–6′) angular rachis; peduncles equaling the leaves; flowers (6–8) distant; corolla violet-purple, 9–12″ long, twice longer than the cylindrical calyx; calyx-teeth lanceolate, not half the length of the tube; legume ¾–1′ long, sessile, erect, thick, cartilaginous, glabrous, oblong-ovate, inflated, not sulcate, the sutures thick and prominent and not intruded, 1-celled, many-seeded.—Very near *A. pectinatus*, but distinguished by its erect and somewhat larger legumes, its few loosely-racemed blue flowers, and sparse short leaflets. West Humboldt Mountains, Nevada; 5,000 feet altitude; May, June. (280.)

Astragalus Chamæleuce, Gray; *l. c.*, 222. Perennial, silvery-canescent with a dense silky pubescence; stems numerous, short, (1–6′,) prostrate, or nearly acaulescent; stipules ovate, membranous, free; leaflets 2–4″ long, 2–6 pairs, oblong, obovate or oval; peduncles shorter than the leaves, slender, 3–8-flowered; calyx-teeth subulate, much shorter than the cylindrical tube; corolla light violet, ¾′ long; legume ½-1′ long, thick-coriaceous, sessile, ovate-oblong, acuminate, somewhat arcuate, terete or somewhat obcompressed and frequently sulcate ventrally, rugosely reticulated and subpubescent, 1-celled, many-seeded.—From Arizona and New Mexico to Southern Idaho, (Burke.) Found in Ruby Valley, Nevada, and in the Wahsatch Mountains and Bear River Valley, Utah; 6–7,000 feet altitude; June, July. The present specimens have more numerous and narrower leaflets than usual. (281.)

Astragalus speirocarpus, Gray; *l. c.*, 225. Perennial, somewhat cinereous with a minute pubescence; stems 1–2° long, numerous, decumbent, simple or branched; stipules small, ovate-lanceolate, nearly free; leaflets 4–9 pairs, 3–6″ long, obovate or oblong, retuse; racemes loose, secund, rather few-(10–20-)flowered; flowers 10″ long, ochroleucous, keel spurred; the cylindrical calyx-tube several times longer than the rather short teeth; legume 1–1½′ long, coriaceous, exsertly stipitate, flattened, glabrous, linear-lanceolate, spirally coiled, perfectly 1-celled, many-seeded.—The legumes in these specimens are much thinner and less rugose than in Lyall's, the sutures not thickened nor showing any tendency to separation. On the Upper Columbia, (Lyall.) On the Trinity, Pah-Ute and Toyabe Mountains, Nevada; 6,000 feet altitude; May–July. (282.)

Astragalus cyrtoides, Gray; *l. c.*, 201. *Proc. Amer. Acad.* 6. 525. Softly pubescent; stems subdecumbent, about 1° long; stipules small; leaflets 7–10 pairs, 4–6″ long, linear-oblong, obovate or obcordate; peduncles much longer than the leaves; racemes spike-like, with spreading or pendulous flowers on short suberect pedicels; calyx-teeth subulate, or ovate, 3-times shorter than the tube; corolla 6–8″ long, ochroleucous, half longer than the calyx; legume cartilaginous, 1-celled, sublinear, terete, acute at each end, pendent upon a stipe longer than the calyx, strongly arcuate-incurved or sometimes annular, margined sutures narrow, the ventral one very acute.—Washington Territory, (Spalding;) near Carson City, Nevada, (Dr. Anderson.)

Astragalus filipes, Torr. *Gray's Rev.*, *l. c.*, 226. Perennial, minutely puberulent; stems 2° long, subdecumbent, simple or branched; stipules small, free; leaflets ½′ long, 5–8 pairs, linear-oblong, obtuse; peduncles slender, much exceeding the leaves; racemes loosely 10–20-flowered; flowers ½′ long, ochroleucous, on slender pedicels, spreading; calyx-tube campanulate, twice longer than the short teeth; legume 1′ long, chartaceous, long-stipitate, flat, glabrous, linear-oblong, straight, reflexed, perfectly 1-celled, many-seeded.—Collected by Dr. Pickering near Fort Okanagan, Washington Territory. Pah-Ute and Toyabe Mountains, Nevada; 6,000 feet altitude; June, July. (283.)

Astragalus porrectus. Perennial, subglabrous; stems ascending, simple, 1–2° long; stipules large and membranous, at least the lower ones sheathing; leaflets 4–6 pairs, ½′ in diameter, broadly obovate, retuse or obtuse; racemes loosely rather many-flowered, elongating in fruit; flowers ½ long, yellow, spreading, the campanulate calyx-tube scarcely longer than the subulate teeth; legume ½–¾′ long, chartaceous, flat, glabrous, oblong, gibbous dorsally, the ventral suture nearly straight, erect upon a spreading pedicel and stipe that exceeds the calyx, perfectly 1-celled, about 10-seeded.—Of the *Homalobus* section and of like habit with *A. Palmeri*. It also much resembles *A. arrectus*, but the structure of the legume is very different. Trinity Mountains, Nevada; 5,000 feet altitude; May. (284.)

Astragalus multiflorus, Gray; *l. c.*, 226. Perennial, somewhat glabrous; stems 1° high, numerous, ascending, slender, branched; stipules dark-colored, the lower ones at least sheathing; leaflets 6–10 pairs, 3–6″ long, linear or narrowly oblong, acute or obtuse; peduncles not exceeding the leaves, loosely few-flowered; flowers ochroleucous, small, 2–3″ long;

the campanulate calyx-tube longer than the teeth and about equaling the stipe; legume 4–6″ long, chartaceous, exserted, flat, glabrous, oblong, sutures about equally curved, reflexed, 1-celled, about 6-ovuled, 2–4-seeded.—From Colorado and the plains of Nebraska north to latitude 65°; at Santa Inez, Southern California, (Antisell.) East Humboldt Mountains, Nevada, and Bear River Valley, Utah; 6–10,000 feet altitude; July, August. (285.)

Astragalus tegetarius. Perennial, dwarf, cæspitose, canescent with a silky pubescence; stems 2–6′ long, numerous and branched, from a much branched caudex, procumbent; stipules membranous, mostly acuminate, sheathing; leaflets 3–5 pairs, 2–3″ long, linear, acute; peduncles slender, about equaling the leaves, 1–3-flowered; flowers small, 2–3″ long, ochroleucous, the keel purplish; calyx-teeth as long as the campanulate tube; legume 2–3″ long, chartaceous, sessile, compressed, pubescent, ovate-oblong, straight, erect, 1-celled, 6-ovuled, 1–2-seeded.—Peaks of the East Humboldt and Clover Mountains, Nevada; 11–12,000 feet altitude; July–September. Plate XIII. Fig. 7. A stem; natural size. Fig. 8. Parts of the flower. Fig. 9. Mature legume. Fig. 10. A legume opened; all enlarged four diameters. (286.)

Astragalus campestris, Gray; *l. c.*, 229. Perennial, minutely pubescent or glabrate; stems 3–15′ high, numerous, ascending, slender, simple; stipules, at least the lower ones, membranous and sheathing; leaflets 5–9 pairs, 3–9″ long, linear, linear-lanceolate or oblong, usually acute; peduncles slender, exceeding the leaves, 5–10-flowered; flowers 4″ long, subcapitate, ochroleucous, tinged with violet, the keel with a purple long and narrow inflexed tip; legume ½–1′ long, chartaceous, sessile, subpuberulent, subcompressed, oblong-linear, nearly straight, (the ventral suture gibbous,) the pedicel at last reflexed, 1-celled, 10–15-ovuled.—Rocky Mountains of Colorado, and northward, (Geyer.) Uinta Mountains, Utah; 8,000 feet altitude; July, August. (287.)

Astragalus junceus, Gray; *l. c.*, 230. Perennial, minutely pubescent or subglabrous; stems usually solitary, erect, paniculately branched, slender; stipules small; petioles slender, sometimes 6′ long, usually naked, or with 1–5 pairs of linear leaflets; peduncles longer than the leaves, 3–7-flowered; flowers 4″ long, distant, ochroleucous or tinged with violet, the keel remarkably incurved; calyx-teeth usually small and obtuse, shorter than the campanulate tube; legume (1–1¼′ long) as in the last; pubescent.—Colorado

(Parry) and Western Wyoming, (Nuttall.) East Humboldt Mountains, Nevada, and in the Wahsatch, Utah; 6–9,000 feet altitude; June–August. This species should include *A. diversifolius*, Gray. (288.)

Astragalus simplicifolius, Gray; *l. c.*, 231. Perennial, cæspitose in dense cushioned mats; leaves 4–5″ long, hoary with an appressed silky pubescence, simple, linear or spatulate-lanceolate, acute, frequently involute, crowding the extremities of the numerous short (½′) branches; scapes scarcely exceeding the leaves, 2–3-flowered; flowers 3″ long, purple, the banner and wings longer than the strongly arched keel; calyx-teeth nearly equaling the obconical tube; legume 4″ long, half included in the calyx, oblong, acute, subcompressed, glabrous, thick and coriaceous, 1-celled, the ventral suture straight and very acute, the dorsal gibbous, about 12-ovuled.—Collected only by Nuttall near the sources of the Platte. Found near Wahsatch Station on the Union Pacific Railroad, on the summit of the divide between the Weber and Bear Rivers; 7,000 feet altitude; May–July. Plate XII. Fig. 3. A stem; natural size but unusually large. Fig. 4. Calyx; enlarged eight diameters. Figs. 5–9. Parts of the flower; enlarged four diameters. (289.)

Astragalus Kentrophyta, Gray; *l. c.*, 231. Perennial, cæspitose, hoary with a short silky pubescence; stems 2–4′ long, numerous and branching, prostrate, rigid; stipules membranous, mostly connate, often setaceously or spinosely acuminate; leaflets 2–3 pairs, 2–4″ long, linear-subulate, usually rigid and divaricate, pungent, not jointed with the rachis; flowers 2″ long, upon short pedicels (1–3) in the axils of the leaves, ochroleucous or tinged with violet; calyx-teeth setaceous, equaling the campanulate tube; legumes 2–3″ long, subchartaceous, sessile, pubescent, ovate, acuminate, subcompressed, somewhat incurved, 1-celled, 3–4-ovuled, 1–2-seeded, the valves separating at maturity.—New Mexico, (Inscription Rocks, Bigelow,) Colorado, and Wyoming. On dry barren hillsides in Monitor and Holmes Creek Valleys, Nevada; 5–6,000 feet altitude; June–September. (290.)

Var. elatus. Stems elongated and erect, 6–18′ high, scarcely branched; not otherwise different from the usual prostrate form. Holmes Creek Valley, Nevada; September. (291.)

Oxytropis campestris, L., Var. viscida. (*O. viscida*, Nutt.) Hairy and viscid throughout with a resinous exudation; scapes 3–4′ high, equaling the leaves; keel tipped with purple.—Collected by Nuttall near the sources of the Columbia. Specimens in Herb. Gray. of Bourgeau's from the Rocky

Mountains, ticketed "*O. campestris, DC.* ?," are nearly the same, but less viscid and with scapes exceeding the leaves. Found in the East Humboldt Mountains, Nevada; 10,000 feet altitude; August. (292.)

GLYCYRRHIZA LEPIDOTA, Nutt. From Arkansas and Missouri north to Hudson's Bay and the Saskatchewan and west to Northern Mexico, California and Oregon. In Humboldt and Goose Creek Valleys, Nevada, and in the Wahsatch Mountains and Salt Lake Valley, Utah; 4,200–6,000 feet altitude; June–October. Known by the Mormons as "Deseret weed." (293.)

HEDYSARUM MACKENZII, Rich. Stems 2° high, suberect, simple or branched, minutely pubescent; stipules, at least the lower ones, connate; leaflets 5–8 (usually 5) pairs, canescently pubescent, oblong or lanceolate, nearly glabrous above; racemes loosely 7–30-flowered, elongating in fruit; flowers large, 6–9″ long, light purple, the keel somewhat exceeding the banner and wings; calyx-teeth subulate, longer than the wings; legume 3–4-jointed, minutely pubescent.—Durand unites this species with *H. boreale*, Nutt., but it is kept distinct by Dr. Hooker. From the Saskatchewan northward to the Arctic Sea and Alaska; Utah, (Stansbury.) Found only in the Wahsatch Mountains; 5–6,000 feet altitude; May–July. (294.)

VICIA AMERICANA, Muhl. Foliage very variable, even upon the same plant; the lower leaves usually narrower than the upper, which vary from linear to ovate, and are acute, obtuse, or truncate, always mucronate. Confined to the banks of streams, sometimes abundant; known as the "Peavine." From New York and Kentucky north to the Arctic Circle and west to the Pacific; New Mexico, (Fendler.) In the Washoe Mountains and Pah-Ute Range, Nevada, and in the Wahsatch and Uintas, Utah; 4,500–6,000 feet altitude; May–October. (295.)

LATHYRUS POLYPHYLLUS, Nutt. Closely resembling *L. maritimus*, Big., but taller, (2° high,) the stipules semi-cordate or semi-sagittate and usually much smaller than the leaflets, the peduncles longer than the leaves, (4–6′,) and the lower segment of the calyx setaceous. Oregon, California, (Brewer,) and Utah. Frequent in the Wahsatch Mountains; 5–10,000 feet altitude; May–July. (296.)

LATHYRUS PALUSTRIS, L. Stems narrowly winged; peduncles 4–10-flowered. From Canada south to Virginia and west through the Saskatchewan region to Washington Territory and Northern California. Varieties are reported from Colorado, Western Texas, and thence west to Arizona and

Northern Mexico. Found in the Wahsatch Mountains, Utah; 5–6,000 feet altitude; May, June. (297.)

Lathyrus ornatus, Nutt. Glabrous or subvillous-pubescent, somewhat glaucous; stems ascending, 6′–1° high, simple or branched, angular; stipules lanceolate, semi-sagittate, entire; leaflets 4–7 pairs, ½–1′ long, lanceolate-linear or oblong, acute, mucronate, rigid and strongly veined, tendril very short; peduncles equaling or exceeding the leaves, about 4-(3–8-) flowered; flowers 1′ long, bright purple; calyx-teeth lanceolate, slightly unequal, shorter than the tube.—On the Upper Missouri and Platte. Found in the Wahsatch Mountains, near Salt Lake City; 5,000 feet altitude; May. Described by Nuttall as glabrous, but these specimens, like others from Colorado, are villous-pubescent. (298.)

## ROSACEÆ.

Prunus Andersonii, Gray. *Proc. Amer. Acad.* 7. 337. Very glabrous; branches thorny; leaves fascicled, small, (4–12″ long,) oblong or lanceolate-spatulate, attenuate into a slender petiole, obtuse or occasionally acute, delicately veined and somewhat nerved, without glands; flowers 2–3 in the axils, on rather long pedicels, (2–3″;) calyx ebracteolate, with the lobes entire and shorter than the turbinate tube; petals 3″ long, rose-color; ovary and base of the style very hirsute; drupe puberulent, somewhat fleshy, subglobose.—A diffusely branched shrub, 2–3° high, the flowers appearing with the leaves, which are apparently convolute in æstivation; the fruit is half an inch in diameter, scarcely eatable, with an orbicular subcompressed stone, which is acutely pointed, rather sharply margined and nearly smooth. Collected by Dr. Anderson and Dr. Torrey near Carson City, and frequent on the foot-hills of the Washoe, Trinity and West Humboldt Mountains, Nevada; 5,000 feet altitude; April–June. (299.)

Prunus emarginata, Walp. (*Cerasus*, Dougl.) Leaves oval, oblong or oblanceolate, usually obtuse and often emarginate, nearly glabrous, bi-glandular; corymb few-flowered; calyx-segments ovate, obtuse, reflexed; drupes globose.—*C. mollis*, Dougl., with somewhat tomentose-pubescent leaves and calyx, is referred to this species. Oregon and Northern California, and collected by Dr. Anderson near Carson City, Nevada. Found in the Washoe Mountains near the same locality; a straggling bush, 4° high, without leaf or flower in April; 7,000 feet altitude. (300.)

PRUNUS VIRGINIANA, L. (?) Scarcely flowering specimens only, from trees having a very different habit from the next, 15° high and 6–10′ in diameter, in a locality where *P. demissa* was but 2° high, with thinner leaves and short racemes, (2′ long.) The young racemes have unusually large membranous bracts, and the stipules are likewise conspicuous. West Humboldt Mountains, Nevada; 9,000 feet altitude. The species is found from Newfoundland to Louisiana and the Arctic Circle, in New Mexico, Colorado and northward. It has not hitherto been reported from west of the Rocky Mountains. (301.)

PRUNUS DEMISSA, Walp. (*Cerasus*, Nutt.) Glabrous; leaves thickish, obovate or oval, abruptly pointed, sharply (often doubly) serrate with straight teeth, petiole mostly biglandular; racemes 3–4′ long, densely flowered; petals orbicular, 2″ in diameter; fruit purplish-black.—Shrubby, often fruiting freely at the height of two feet, but reaching 12° in height in favorable localities, and 4–6′ in diameter; with the thick leaf of *P. serotina* and a pleasanter fruit, it otherwise more resembles *P. Virginiana*, and is also commonly known as the "choke cherry." In the mountains from the Columbia to Southern California; New Mexico, (Fendler.) Frequent in Nevada and Utah, from the Washoe Mountains to the Wahsatch; 5–10,000 feet altitude; flowering in May and June, fruit ripening in September. A variety was met with having the fruit light-red, larger, more juicy, and with a thinner skin. (302.)

SPIRÆA OPULIFOLIA, L. From Georgia to Missouri and northward to Canada and the Saskatchewan; also in Oregon, California, and New Mexico, (Bigelow.) Frequent in the Tuilla, Wahsatch and Uinta Mountains, Utah; 5,000 feet altitude. (303.)

Var. PAUCIFLORA, Hook. Leaves smaller, nearly glabrous; corymb few-flowered; carpels 2–4 or sometimes solitary, tomentose.—These specimens from several stations in the East Humboldt Mountains, Nevada, and from Stansbury Island in Salt Lake, have the leaves for the most part tomentose with a minute stellate pubescence, especially beneath, sometimes nearly glabrous; corymbs 5–10-flowered, very shortly peduncled or sessile, flowers rather smaller; ovary always solitary; stamens 20, or sometimes 15. A small shrub, 2° high; certainly as deserving the rank of a species as the following. (304.)

SPIRÆA DUMOSA, Nutt. (*S. ariæfolia*, Var. *discolor*, T. & G.) Leaves broadly ovate, cuneate and petioled, obtuse, sublobate and dentate, the serra-

tures scarcely mucronate, lighter colored and sericeous beneath, smoother or nearly glabrous above; flowers numerous, in more or less branched terminal panicles, branches and calyx tomentose-pubescent; calyx-segments ovate, spreading; carpels very hirsute.—A low branching shrub, 2–3° high, with small leaves ½–1′ long, confined to dry cliffs and mountain-sides. Rocky Mountains of New Mexico, Colorado and Wyoming, west to California (Brewer) and Oregon, (Geyer.) Throughout Nevada and Utah; 5–10,000 feet altitude; July–September. It takes the place in the mountains eastward of the much taller and larger-leaved *S. ariæfolia* of the valleys of Oregon and California, upon which Pursh probably founded his *S. discolor*. His specimens, however, were from nearly the same region as Geyer's, and may belong to this species, in which case his name has the precedence. (305.)

Spiræa cæspitosa, Nutt. Shrubby, prostrate; leaves rosulate on the very short matted branches, small, (2–6″ long,) spatulate-oblong, entire, silky-villous; flowering stems erect, 1–5′ high, rarely branched, with small scattered leaves; flowers in a dense cylindrical spike, white; carpels 3–5, distinct.—Growing upon limestone cliffs, the stems hugging the rocks, and forming dense green mats, the branchlets beneath compacted with persistent dead leaves of previous years. The stems attain considerable size, sometimes an inch or more in diameter at base, but the absence of annual rings prevents a determination of their age. Collected in Chihuahua, New Mexico, and Northern Arizona, at the sources of the Platte, and at Crater Pass in the Cascade Mountains, Oregon, (Newberry.) In the East and West Humboldt Mountains, Nevada; 6–9,000 feet altitude; August–October. (306.)

Var. elatior. Flowering stems taller, (6–10′,) branched, the lateral spikes short; leaves an inch or more long; flowers somewhat variable; petals orbicular to linear-spatulate, smooth or hairy within; ovaries as many as the lobes of the calyx, (5–8,) very hairy or nearly smooth.—Found at the eastern end of the Raft River Mountains, Utah; 7,000 feet altitude. (307.)

Rubus Nutkanus, Moç. Stems 2–3° high, with the large leaves (4–6′ in diameter) nearly glabrous; fruit rather large but thin, light red, with an agreeable peculiar flavor; flowers 1½′ in diameter. From Southern Alaska to Northern California and to the eastern slope of the Rocky Mountains and Colorado; New Mexico, (Fendler;) and shores of Lake Superior. In the

East Humboldt Mountains, Nevada, rare; much more frequent in the Wahsatch; 7,000 feet altitude; June–August. (308.)

Rubus strigosus, Mx. From Pennsylvania to Newfoundland, Hudson's Bay, and the Great Slave Lake, thence south along the Rocky Mountains to Colorado (*R. Idæus*, 212 Parry) and New Mexico, (Fendler.) Rare and alpine in the East Humboldt and Clover Mountains, Nevada; 10,000 feet altitude; more frequent in the Wahsatch and Uintas, at an elevation of 5,500–7,500 feet. (309.)

Rubus leucodermis, Dougl. Glaucous, armed with very strong recurved prickles; stems erect; 3-foliolate or pedately 5-foliolate; leaflets broadly ovate, incised and serrate, acute, canescently tomentose beneath, the upper long-petiolulate, the two lower smaller and nearly sessile; stipules setaceous; peduncles axillary and terminal, few-flowered; petals nearly equaling the sepals; fruit large, brownish black with a white bloom.—Resembling *R. occidentalis.* Oregon; San Francisco Mountains, New Mexico, (Bigelow.) Found only in the Wahsatch Mountains, Cottonwood Cañon; 6,000 feet altitude; in fruit, July. (310.)

Purshia[1] tridentata, DC. Of dense growth, 2–4° high; stipules minute; leaves 3–12″ long; calyx-lobes ovate, obtuse; petals obovate, exceeding the calyx, 3–5″ long; fruit ½′ long, tardily dehiscent, 2-valved.—From Colorado, Northern Arizona (Ives) and California to Washington Territory and the sources of the Missouri. On foot-hills in Nevada and Utah, in many places very abundant; 5–6,000 feet altitude; May–October. (311.)

Cercocarpus[2] parvifolius, Nutt. A shrub, 2–10° high, branching from the ground; leaves ½–1½′ long, cuneiform-obovate, silky-pubescent or

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[1] PURSHIA, DC. Calyx persistent, tubular-infundibuliform, imbricately 5-lobed. Petals 5, unguiculate. Stamens 10–25, in one series, with free filiform filaments and large anthers. Carpels 1–2, free; style short, curved, persistent, stigmatose at the top and one side: ovule solitary, erect. Fruit coriaceous, ovate-oblong, pubescent, sessile, exceeding the calyx. Seed with a membranous double testa, the two coatings separated from each other by a layer of deep-purple intensely bitter granular matter; cotyledons flat, obovate; radicle short, inferior.—A diffusely branched leafy shrub, tomentose and somewhat glandular-pubescent upon the leaves, calyx and fruit; leaves small, alternate and fasicled, subcuneiform, 3-cleft, the lobes short-linear with revolute margins, canescent beneath; flowers yellow, subsessile, solitary, axillary and terminal.

[2] CERCOCARPUS, HBK. Calyx-tube persistent, cylindrical, long and pedicelliform, terete; lobes of the hemispheric deciduous limb 5, small, valvate. Petals none. Stamens 15–25, in 2–3 series, seated on the limb of the calyx, with short free incurved filaments, and anthers often pubescent. Ovary solitary, with a single suberect ovule; style filiform, villous. Achenium linear-oblong, coriaceous, included in the calyx, caudate with the persistent long plumose style; seed linear, with membranous testa, elongated cotyledons, and inferior radicle.—Shrubs or trees, with alternate simple leaves and axillary or terminal flowers. Benth. & Hook.

nearly glabrous above, tomentose-canescent beneath, serrately toothed toward the apex, strongly nerved; flowers solitary or 2–4 together, on slender pedicels; calyx-tube becoming ½′ in length; tail of the fruit (4′ long) densely plumose.—From New Mexico northward to Wyoming Territory and west to California. Found in the Wahsatch and Uinta Mountains, but not seen in Nevada; 6–7,000 feet altitude; in flower and fruiting, July. (312.)

CERCOCARPUS LEDIFOLIUS, Nutt. Leaves ½–1½′ long, coriaceous, lanceolate, entire, nearly veinless with a strong midnerve, margins revolute, usually glabrous above and more or less tomentose beneath, somewhat fascicled; flowers 2–6 together, sessile; calyx-tube becoming 4″ long; tail of the fruit very plumose, 3′ long, twisted.—An evergreen, with hard heavy dark-colored wood, and known as "mountain mahogany;" not usually exceeding 10–15° in height and 6–12′ in diameter, and much resembling the apple tree in habit, but sometimes becoming a handsome tree 2½° through and 40° or more high. It is quite variable in its pubescence and the flowers are very rarely 2-carpelled. Nuttall describes the achenium as 2-seeded; this does not appear to be the case. Frequent on mountain-sides through Nevada and Utah from the Washoe Mountains to the Wahsatch, extending into Idaho and California; 6–8,000 feet altitude; June–September. (313.)

CERCOCARPUS BREVIFLORUS, Gray. *Plant. Wright.* 2. 54. Leaves ½′ long, coriaceous, spatulate-oblong or linear by the revolution of the margins, entire, sessile, somewhat fascicled, silky-puberulent on both sides or glabrous above; flowers sessile, solitary or in pairs, rather small, 2″ in diameter; calyx becoming 2″ long; the plumosely-tailed fruit 1–2′ in length.—A very diffuse densely and rigidly branched evergreen shrub, 1–6° high; the leaves on these specimens are strongly revolute, shining above, the branchlets almost spinose. Collected by Wright near Frontera in New Mexico; now found only in the American Fork cañon of the Wahsatch Mountains, Utah; 5,000 feet altitude. (314.)

COWANIA[1] MEXICANA, Don. (*C. Stansburiana*, Torr. *Stans. Rep.*, *p.* 386, *t.* 3.) Leaves 4–7″ long, terminating the branchlets, cuneate at base and

[1] COWANIA, Don. Tube of the persistent calyx turbinate; limb 5-lobed, valvate. Petals 5, obovate, spreading, exceeding the calyx. Stamens numerous, crowded in 2 series, inserted on the mouth of the calyx; filaments for the most part free, short, incurved. Carpels 5–12, sessile, free, villous, 1-celled; style short, villous; ovule solitary, ascending. Achenia included in the calyx and terminated with the very long plumose styles. Seed erect; testa membranous; albumen thin; cotyledons oblong; radicle inferior.—Much branched shrubs, with small alternate coriaceous plicate divided leaves, margins revolute, white-tomentose beneath, and large sessile solitary terminal flowers. BENTH. & HOOK.

short petioled, pinnatifidly 3–7-lobed, lobes oblong or linear, somewhat glabrous above, dotted with conspicuous glands; flowers on short peduncles, yellow, 1′ in diameter; calyx glandular-tomentose, with broad and obtuse segments; achenium 3″ long, glabrous or slightly hairy, striate; style 2′ long, densely plumose.—A handsome shrub, 1–6° high; the trunk covered with an abundant loose shreddy cream-colored bark; the wood light-colored, hard, very compact and fine grained; blooming abundantly in May and retaining its fruit until October; well worthy of cultivation. Northwestern Mexico, Arizona, New Mexico and Utah. Found on Antelope Butte, Nevada, and frequent on the foot-hills above the Salt Lake Valley; 5–6,000 feet altitude. (315.)

DRYAS OCTOPETALA, L. Leaves oblong, oblong-ovate or subcordate, obtuse, crenately serrate, white-tomentose beneath, veins prominent and margins revolute; sepals linear-lanceolate; flowers white or yellowish.—From Greenland south to Labrador and Canada and west to Behring Strait, and on the alpine peaks of the Rocky Mountains southward to Colorado. Found on the Uinta Mountains, Utah; 11–12,000 feet altitude; August. The flowers are decidedly yellow and the sepals are variable in form, the length often scarcely twice the width. It would seem that *D. Drummondii* should share the fate of *D. integrifolia*. (316.)

GEUM MACROPHYLLUM, Willd. New Hampshire, Canada, and the western lake region; from Alaska to California, (Mono Pass, Bolander;) New Mexico, (Fendler.) Found on stream banks in Ruby and Thousand Spring Valleys, Nevada, and in the Wahsatch; 6,000 feet altitude; June–September. (317.)

GEUM TRIFLORUM, Pursh. From Newfoundland to Northern New York, Illinois and Missouri, to latitude 60°, and in the mountains westward; reported from Washington Territory, California, Northern Arizona, (Ives,) and Colorado. Found in the Battle Mountains, Nevada, and in the Uintas, Utah; 7–8,000 feet altitude; June–August. (318.)

GEUM ROSSII, Seringe. Scape 1-flowered, 3–8′ high, slightly pubescent above, somewhat 2-leaved; radical leaves interruptedly pinnate, rather glabrous, minutely ciliate, leaflets ovate or cuneiform, 2–3-lobed or entire; flowers erect; calyx-lobes ovate, spreading, shorter than the roundish petals; carpels in a sessile head, minutely hirsute; styles persistent, glabrous, not exserted in fruit.—Melville Island, Behring Strait, and the Rocky Mountains

of Colorado. Found on the Uinta Mountains, Utah; 10–12,000 feet altitude; August. (319.)

Var. β., T. & G. Silky-pubescent; stems taller, 8′–1° high, sometimes 2–5-flowered. Unalaska and Colorado. East Humboldt Mountains, Nevada; 9,000 feet altitude; August. (320.)

FRAGARIA VESCA, L. Throughout the Northern States and to the Arctic Circle; Washington Territory to California; New Mexico, (Fendler and Bigelow.) Near Washoe Lake, Nevada, at 5,000 feet altitude, in May, and in the Uinta Mountains, Utah, at 8,000 feet altitude; not yet in fruit, July and August. (321.)

FRAGARIA VIRGINIANA, Ehrh. Var. (?) GLAUCA. Fruit ovate, pitted, sessile; calyx not reflexed; peduncles shorter than the leaves; leaves glabrous, slightly hairy upon the veins beneath, ciliate, glaucous; peduncles and petioles more or less tinged with red, sparingly pubescent with subappressed hairs; very stoloniferous.—In the Wahsatch and Uintas; 6–7,000 feet altitude; June, and in July in fruit. Differing from *F. Virginiana* chiefly in the perfectly smooth and glaucous surface of the leaf, much more remarkable in the green than in the dried plant. (322.)

POTENTILLA NORWEGICA, L. From Labrador and the Northern States to the Arctic Circle and on the western coast as far south as the Columbia River; New Mexico, (Fendler.) In the Uintas; rare, a single specimen only being collected, but that a well-marked one; 6,000 feet altitude; July. Dr. Hayden reports it from Wyoming Territory. (323.)

POTENTILLA MILLEGRANA, Engelm. *Lehm. Rev. Potent., p.* 201. Stems slender, 1–3° high, erect or decumbent, leafy, subvillous-pubescent, branching above into elongated loosely many-flowered branchlets; leaves ternate, the lower on long petioles, leaflets 1–1½′ long, obovate, becoming oblong-lanceolate above, obtusely serrate, pubescent or nearly glabrous; flowers small, (2″ in diameter,) numerous and loosely panicled; stamens usually 10, two opposite each sepal; seeds small, usually smooth.—Distinguished from *P. Norwegica* by its slender habit, smaller leaves, and smaller more numerous and more loosely panicled flowers. The mature seeds are often as large, as dark-colored, and sometimes as striate as in *Norwegica*, and the calyx enlarges in fruit but does not exceed 6–7″ in diameter. Collected in Missouri, Colorado, on the east slope of the Sierra Nevadas, (Brewer,) and in Arizona

at Fort Mohave, (Cooper.) It is of frequent occurrence on stream banks through Nevada and Utah; 4–6,000 feet altitude; June–September. (324.)

Var. Growing in damp shade; stems 2° long, decumbent, weak, divaricately branched, and with the petioles somewhat viscidly pubescent; leaflets glabrous, very thin, 2′ long; outer calyx-segments spreading and foliaceous; seeds white, small, and very smooth. (325.)

POTENTILLA PENNSYLVANICA, L., Var. STRIGOSA, Pursh. Low; leaflets mostly tomentose on both surfaces, deeply pectinate-divided; segments linear, entire, with revolute margins; stipules laciniate.—Rocky Mountains of Colorado. On rocky ridges in the East Humboldt Mountains, Nevada; 9,000 feet altitude; August. (326.)

POTENTILLA DIVERSIFOLIA, Lehm. More or less silky-pubescent with white hairs; stems ascending; radical leaves 5–7-foliolate, the cauline subsessile and usually 3–5-foliolate, either pinnate, pedate or palmate; leaflets unequal, cuneiform, incisely toothed or lobed, the lobes silky-villous at the apex; stipules ovate-lanceolate, entire; flowers few or several, on long divaricate or erect pedicels; petals obcordate, nearly twice the length of the calyx; styles slender, not fleshy nor thickened at base.—A low alpine or subalpine species, rarely attaining a foot in height, and exceedingly variable in its leaf-section. Several very diverse forms occur in the collection, some of which probably merit the rank of varieties. In the Rocky Mountains from Colorado to latitude 56°. Varieties are found also in the Sierras of California. The typical form was collected in the East Humboldt Mountains, Nevada; 9-10,000 feet altitude; July, August. (327.)

Var. GLAUCOPHYLLA, Lehm. *l. c., p.* 73., *t.* 31. Glaucous-green; leaves digitate, nearly glabrous on both sides; leaflets silky on the margin, with unequal segments.—Rocky Mountains of Wyoming (Nuttall) and Colorado, (219 Parry, 171 Vasey;) collected also by Bourgeau in British America. Found on the East Humboldt Mountains, Nevada, and on the Uintas; 9–12,000 feet altitude; August. (328.) There is also what seems to be a reduced form of this, with the three upper leaflets cuneate, 3-lobed at the apex, the lower entire and scattered along the rachis or wanting; stems 1–3-flowered. Uinta Mountains; 12,000 feet altitude; August. (329.)

Var. MULTISECTA. Canescent with a not very dense silky pubescence; leaves digitate or nearly so, the leaflets digitately or pinnately divided and

the segments linear.—East Humboldt Mountains, Nevada; 9,000 feet altitude; July. (330.)

Var. PINNATISECTA. Silky-pubescent; leaves pinnate, leaflets cuneate-ovate or oblong, pinnately lobed, the segments oblong.—This approaches and may be the same as *P. Plattensis*, Nutt., which however was collected by him on the plains of the Platte, while these specimens, as well as somewhat similar ones from Colorado and the Sierras (161 Hall & Harbour, 165 Vasey, 5084 Bolander) are decidedly alpine. *P. Soongarica*, Bunge, scarcely differs from some of these specimens. East Humboldt Mountains, Nevada, and on the Wahsatch and Uintas; 10–11,000 feet altitude; July, August. (331.) A still more alpine form of this variety, more densely pubescent and with smaller and more crowded leaflets, was collected in the Clover Mountains, and in the Uintas; 11–12,000 feet altitude; August, September. (332.)

POTENTILLA PULCHERRIMA, Lehm. (*P. Pennsylvanica*, var. *pulcherrima*, T. & G.) Stem ascending, villous; leaves 7–9-foliolate, upper ones 5-foliolate, leaflets crowded or even digitate, elliptic, equally serrate, appressed-pilose above, white-tomentose beneath; stipules ovate, acute, entire; flowers upon slender pedicels in a loose corymbed panicle; petals obcordate, longer than the acuminate green sepals; styles slender, not fleshy nor thickened at base.—Stems tall (2° high) and slender, with 1–2 leaves, few from one root, somewhat purplish; leaflets 1–3′ long; flowers bright orange, in an open panicle; sepals not tomentose. This species has been considered a variety of *P. Pennsylvanica*, but is distinguished by its long slender styles and its much looser panicles. If reduced, it must be referred rather to *P. nivea*, as *Pennsylvanica* to *sericea*. Collected by Drummond in the Rocky Mountains, latitude 52–56°. East Humboldt Mountains, Nevada, and Uintas; 6,500–8,000 feet altitude; July. (333.) Some of the specimens collected have the leaves perfectly digitate; evidently the same as the last, and sometimes growing with it. From the East Humboldt Mountains, Nevada, and the Wahsatch; 5,500 feet altitude; June, July. (334.)

POTENTILLA NIVEA, L. Villous or tomentose; stems ascending, few-flowered; leaves mostly radical, palmately 3- (rarely 5-)foliolate; leaflets oval or obovate-cuneiform, pinnatifid, toothed or incised, silky-hirsute or nearly glabrous above, canescent-tomentose beneath; stipules lanceolate, entire; petals broadly obcordate, longer than the acute calyx-segments.—A low arctic

or alpine species. Greenland, Labrador, and the Arctic Coast to Behring Strait and southward in the Rocky Mountains to Colorado. Found in the Uintas; 11,000 feet altitude; August. The specimens are 3- (a single one pinnately 5-)foliolate. 215 Parry and 172 Vasey are the same, while 217 Parry, 159 and 160 Hall & Harbour, and 164 Vasey, which are digitately 5- (sometimes pinnately 7-)foliolate, and also larger, would seem to connect this species and the last. (335.)

Potentilla gracilis, Dougl. Stem erect, tall, (2° high,) villous-pubescent; leaves palmately 5–7-foliolate, the radical on long petioles, the cauline (1–2) often subsessile; leaflets oblanceolate, deeply pinnatifid-serrate with lanceolate spreading teeth, canescently tomentose beneath; stipules large, ovate-lanceolate, acuminate, entire or coarsely toothed; cyme fastigiate, somewhat crowded; peduncles strict, becoming elongated; petals obcordate, exceeding the ovate-lanceolate acute villous-tomentose sepals; styles slender.—Somewhat resembling *P. pulcherrima*, but stouter, more strictly and densely corymbed, the leaflets more deeply serrate, more silky-pubescent on the upper surface, and very rarely subpinnate. From Washington Territory to the plains of the Saskatchewan; Wyoming Territory (Frémont.) Near streams in the Pah-Ute and Shoshone Mountains and Ruby Valley, Nevada, and in the Wahsatch; 6,000 feet altitude; June, July. (336.)

Var. Stems low, (6–9′ high,) ascending; canescently silky-tomentose. This is probably Nuttall's *P. fastigiata*. Diamond Valley, Nevada. (337.)

Var. flabelliformis, Nutt. Tall; leaves 5–9-foliolate; leaflets crowded, deeply pinnatifid, the lobes linear-lanceolate.—Saskatchewan region, Oregon, and Northern California. Havallah and East Humboldt Mountains, Nevada; 6,000 feet altitude. (338.)

Potentilla Nuttallii, Lehm. (*P. rigida*, Nutt.) Pubescent with short appressed hairs "and minutely glandular," not canescent; stem erect, stout; leaves palmately 5–7-foliolate, leaflets cuneiform-oblong, deeply pinnatifid-toothed, segments lanceolate; stipules broadly ovate, mostly entire; petals broadly obcordate, exceeding the ovate-lanceolate sepals.—Tall (18–30′ high) and rather stout; *Potentilla* (1) of Bourgeau, 179 Anderson, 98 Bridges, 5036 Bolander, &c., varying in some respects, are apparently the same, though the glandular character of the pubescence is wanting in all. From Nebraska and the Saskatchewan to Oregon and California. On stream banks in

Truckee Valley and East Humboldt Mountains, Nevada; 4–9,000 feet altitude; July–September. (339.)

POTENTILLA ANSERINA, L. From Pennsylvania to Wisconsin and north to Greenland, throughout British America and Alaska, and from the Rocky Mountains west to California and Oregon; New Mexico. Diamond and Ruby Valleys, Nevada, and in the Jordan Valley and the Wahsatch; 4,300–6,000 feet altitude; May–July. (340.)

POTENTILLA FRUTICOSA, L. From the Northern States throughout British America to the Rocky Mountains and Behring Strait; in the mountains of Wyoming, Colorado, and California. In the East Humboldt Mountains and the valleys on each side, and in the Uintas; 6–11,000 feet altitude; July, August. (341.) The alpine form, somewhat reduced and of more compact growth, has the leaves very short and linear. (342.)

POTENTILLA GLANDULOSA, L. Stem erect, branched above, villous-pubescent, viscid toward the summit, as also the peduncles and calyx; leaves pinnately 5–9-foliolate; leaflets ovate or roundish, or of the nearly sessile cauline leaves obovate or oblong, all deeply and often doubly serrate-toothed or incised; stipules mostly entire; branches of the cyme elongated and rather loosely flowered; calyx-segments ovate, acute, equaling the broadly oval yellow petals; style fusiform and fleshy, inserted below the middle of the ovary; disk conspicuous but not glandular.—Stem 2° high; distinguished from *P. arguta* by its more numerous and slender branches and looser heads of somewhat smaller flowers, and by the eglandular disk. Oregon and California. Found in the Pah-Ute, Battle, and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–6,500 feet altitude; May–September. (343.)

POTENTILLA PROCUMBENS, Clairv. (*Sibbaldia*, L.) Greenland, Labrador, and the White Mountains; Unalaska; the Rocky Mountains from Colorado to latitude 56°, and the Sierras of California. Found on the East Humboldt Mountains, Nevada, and on the Uintas; 10–12,000 feet altitude; August. (344.)

HORKELIA[1] PARVIFLORA, Nutt. Tomentose; stem 1° high, viscidly-villous above, leafy; radical leaves 9–13-foliolate; leaflets short, roundish, the

[1] HORKELIA, CH. & SCHL. Calyx campanulate, 10-cleft. Petals unguiculate or spatulate, (white or pink.) Stamens 10, inserted on the throat of the calyx; filaments short, dilated, usually deltoid, petaloid and persistent. Carpels many, or sometimes rather few, upon a small elevated villous receptacle; style articulated with the top of the ovary.—Leaves pinnate with numerous leaflets, which are somewhat scattered, usually cleft or parted, the upper ones confluent. GRAY, *Proc. Amer. Acad.* 6. 528.

upper ones cuneiform, incised; stipules ovate-lanceolate, small, entire or toothed; flowers crowded, fastigiately cymose; bracts short, 3–5-cleft; calyx-lobes narrowly triangular, exceeding the linear-subulate accessory ones; petals spatulate, longer than the calyx.—Root thick, fusiform; flowers small, rose-color. Oregon, (Nuttall.) Near Carson City, (112 Anderson,) and Lake Washoe, (123 Torrey.)

IVESIA[2] GORDONI, T. & G. (*Horkelia*, Hook., *Kew Jour. Bot.* 5. 341, *t.* 12.) Viscid-pubescent or glabrate; stems 3–8′ high, several from a thick resinous caudex, exceeding the leaves; leaflets 2–3″ long, about 20 pairs, 3–5-parted, segments cuneate-oblong or linear-oblong, obtuse, entire or bifid; the single cauline leaf ½–1′ long, subpinnately divided with entire leaflets; stipules ovate-lanceolate, entire; cyme capitate, many-flowered; calyx turbinate, the lobes triangular-ovate, a little longer than the accessory linear ones; petals yellow, oblong or oblanceolate, about equaling the shorter sepals, (or suborbicular and exceeding the calyx;) stamens 5; receptacle long-villous; carpels 1–3, usually 2, (sometimes 6–14.)—The numerous specimens of the collection are constant in their characters, having but 1–3 carpels, 5 stamens, and short narrow sepals, (both before and after anthesis,) and accord in these respects with 1896 and 2071 Brewer. His 1698 and 1723 differ in their much larger conspicuous orbicular petals and in their larger number of carpels. But the number both of carpels and stamens is variable in most of the species of the genus. *I. lycopodioides*, described as pentandrous, has sometimes 10–15 stamens, and *I. pygmæa* has often as many as 15 carpels. Both differ from *I. Gordoni* in their much less villous receptacle and shallower calyx. On the Upper Platte, (Gordon;) New Mexico and the Sierras of California. Abundant in localities in the Wahsatch and Uintas at an elevation of 9–10,000 feet; July, August. (345.)

IVESIA BAILEYI. Viscidly pubescent; stems several, 3–6′ high, from a thick perennial branching caudex, slender, branching above, exceeding the leaves; leaflets 2–3″ long, 3–10 pairs, broadly ovate or flabelliform, 3–7-toothed or 3–7-parted; stipules ovate, entire or 2–3-toothed; flowers axillary

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[2] IVESIA, T. & G. Calyx campanulate or cyathiform at base, 10-cleft. Stamens definite, (5, 10, 15, 20;) filaments slender, narrowly subulate or filiform. Carpels few, sometimes solitary, upon a small villous receptacle; style subterminal.—Leaves pinnate, leaflets very numerous, small, palmately or pedately-parted, closely crowded, sometimes quasi-verticillate or imbricate on all sides of the rachis; petals broadly obovate, scarcely unguiculate, becoming spatulate. GRAY, *Proc. Amer. Acad.* 6. 530.

This genus, as well as the preceding one, is reduced to *Potentilla* by Bentham and Hooker and by other botanists. However correct this may prove to be, it is thought best here to consider them as distinct.

upon slender pedicels, in a loose open panicle, nodding in fruit; calyx concave or broadly turbinate, the lobes ovate-triangular, acute, a little longer than the oblong obtuse accessory segments; petals yellow, spatulate-oblong, shorter than the sepals; stamens 5; carpels 1–5; receptacle flattened, very hirsute.—Resembling *Potentilla Newberryi*, Gray, (*I. gracilis*, Torr.,) but differing in its perennial root, the small number of stamens and carpels, the style not at all enlarged or glandular at base, the small receptacle, and the achenium but slightly rugose. *P. Newberryi* was found on the shore of Rhett Lake in Northern California. This species is confined to the dry debris of granite rocks on mountain ridges. West Humboldt Mountains, Wright's Cañon, Nevada, (W. W. Bailey;) 7,000 feet altitude; September. The typical form has the leaflets toothed but not parted, and but 1–3 carpels. (346.)

Var. SETOSA. Leaflets deeply lobed or parted, the segments setose at the tip; carpels 5. East Humboldt Mountains, Nevada, (Frémont's Pass;) 7,000 feet altitude; August. (347.)

IVESIA KINGII. Stems several from a thick perennial root, decumbent or ascending, 6′–1° long, and with the leaves very glabrous and glaucous; leaflets (often imbricated on the younger leaves) ternate, the segments 1–3″ long, ovate, oblong or orbicular, entire, occasionally bristle-pointed, the cauline leaves often with simple leaflets; cyme loosely panicled; the calyx and slender elongated pedicels somewhat pubescent; accessory lobes narrow-subulate, shorter than the lanceolate true ones; petals 2″ long, white, unguiculate, orbicular, emarginate, longer than the sepals; stamens 20, (sometimes 15,) apparently in 2 rows, 2 opposite each sepal, and the intermediate ones inserted lower upon the broadly turbinate calyx-tube; anthers not mucronulate; carpels 5–8.—Near *I. Pickeringii*, Torr. Found in wet clayey subalkine soils in Monitor, Diamond and Ruby Valleys, Nevada; 6,000 feet altitude; July. (348.)

ROSA BLANDA, Ait. From Vermont to Pennsylvania and Wisconsin, west to the Rocky Mountains, and north to the Arctic Circle; California, and in the Rocky Mountains of Colorado and New Mexico. Frequent on stream banks in the mountain ranges through Nevada, and in the Wahsatch; 4,500–8,000 feet altitude; May–September. Usually 4–6° high and growing in dense thickets; sometimes, among trees, climbing to the height of 15°; fruit globose or obovate; calyx-segments tomentose on the edges. (349.)

Rosa fraxinifolia, Bork. Resembling the last; flowers large, 3′ in diameter, and fruit also much larger, 6–8″ in diameter; rather more pubescent and glandular; 2–3° high, growing solitary on dry ridges.—The more usual form in Utah; not seen in Nevada. Common from Washington Territory to Northern California; Wyoming Territory, (Frémont.) (350.)

Pyrus sambucifolia, Ch. & Schl. From the northern frontier of the United States to latitude 55–60° and west to the Pacific; Cascade Mountains, Washington Territory; Rocky Mountains of Colorado, (Vasey.) Found in the East Humboldt Mountains, Nevada, (rare,) and in the Wahsatch and Uintas; 7–8,000 feet altitude; June–September. (351.)

Cratægus rivularis, Nutt. (?) Leaves obovate, subrhomboidal or lanceolate, cuneate at base and attenuate into a slender petiole, acuminate, unequally serrate, sometimes slightly lobed, slightly pubescent above with the petiole, at length coriaceous and shining; corymb glabrous or somewhat pubescent, 6–12-flowered; calyx-segments long-acuminate, subglandular, as also the slender pedicels; petals rather large, 2–3″ in diameter; styles 3–5; fruit large, 4–6″ in diameter, dull purple with whitish dots, juicy and edible.—A shrub 8–12° high, with reddish branches and few short stout thorns. There is an uncertainty in the determination of these specimens; they certainly do not agree with Nuttall's description in the characters of the calyx, and the leaves are rarely obtuse as in his scant specimen in Herb. Torrey; nor yet do they accord with Var. *Douglasii*, T. & G., of *C. sanguinea*, Pall., (which had been before referred to both *punctata* and *glandulosa*, and made by Lindley a distinct species, *C. Douglasii*,) which has broadly ovate leaves, doubly serrate and usually lobed, and smaller fruit. Banks of streams, Oregon. Found in the Humboldt Valley at the foot of the Clover Mountains, Nevada, and in the Wahsatch, Utah; 5,500 feet altitude; flowering in May, fruit ripe in September. (352.)

Amelanchier Canadensis, T. & G., Var. alnifolia, T. & G. In the Western States and from the Upper Missouri to Washington Territory and California, Arizona and New Mexico. Abundant in all the higher ranges of Nevada and Utah, and giving their name to the "Toyabe" Mountains; 5–10,000 feet altitude; in flower, May–July; fruit ripe in August. (353.)

## SAXIFRAGEÆ.

Saxifraga cæspitosa, L. Perennial, cæspitose; leaves glandular-pubescent, 3–5 cleft, the upper linear and entire, segments broadly linear, obtuse; flowering stems with a few scattered leaves, glandular, 1–4-flowered; calyx-tube adherent to the ovary; petals white, obovate, 3-nerved, twice the length of the calyx.—A dwarf alpine plant, stems an inch or two high; in these specimens 1-flowered, with the petals scarcely exceeding the calyx. Arctic America from Greenland to Behring Strait; Rocky Mountains of Colorado (Parry.) Uinta Mountains; 11,000 feet altitude; August. (354.)

Saxifraga rivularis, L. The root usually granulate, but the plant otherwise not at all different from the ordinary forms; glabrous or pubescent; seeds minutely longitudinally rugose. Arctic America from Greenland to Behring Strait; Labrador, White Mountains, and Rocky Mountains of Colorado. Uinta Mountains, growing in the shaded clefts of rocks wet from melting snows; 10–12,000 feet altitude; August. (355.)

Saxifraga adscendens, L. (*S. controversa*, Sternb.) Annual, glandular-pubescent; stems erect, leafy; leaves cuneate-ovate, 3–5-toothed at the apex, the earlier spatulate and entire, the radical ones crowded; branchlets 3-flowered; pedicels bibracteate, about equaling the fruit.—Alpine; stems 1–3′ high, 1–3 from the same root, branching above; flowers pinkish or yellowish-white; calyx-lobes ovate, obtuse, shorter than the petals. Rocky Mountains of British America (Bourgeau) and of Colorado (Hall & Harbour.) Clover Mountains, Nevada, and in the Uintas; 10–11,000 feet altitude; August, September. (356.)

Saxifraga nivalis, L. Perennial; leaves all radical, obovate or spatulate, attenuate into a petiole, unequally crenate-dentate; scape capitately or subcorymbosely several- or many-flowered, the half-adherent calyx erect, shorter than the oblong obtuse subunguiculate white petals; capsules purple, divergent.—From Labrador and Greenland to Behring Strait and Unalaska, and southward on the Rocky Mountains to Colorado; California (Brewer.) Found on the Clover Mountains, Nevada, and on the Uintas; 10–11,000 feet altitude; August, September. (357.) It sometimes occurs with the flowers in an open panicle, not distinguishable from the eastern *S. Virginiensis.* East Humboldt Mountains; 9,000 feet altitude; August. (358.)

Saxifraga integrifolia, Hook. Very viscidly pubescent; leaves very

obtuse, entire or very slightly sinuate-crenate; scape elongated, paniculate at the apex, the panicle loose, rather narrow or sometimes expanded; calyx glabrous, segments at length reflexed; otherwise as in the last.—A tall and slender species, 1–3° high, approaching nearly at times to forms of *S. nivalis*, but probably to be kept distinct. The present specimens have compact granulate roots. Oregon and California. Wahsatch Mountains; 6,000 feet altitude; June. (359.)

SAXIFRAGA PUNCTATA, L. (*S. æstivalis*, Fisch.) Perennial, villous-pubescent or nearly glabrous; leaves radical, 2′ in diameter, long-petioled, roundish-reniform or orbicular, equally and deeply dentate, the teeth mostly acute; scape slender, (1–1½° high,) the peduncles and pedicels of the usually open panicle glandular; bracts small, linear; petals white, oval or orbicular, unguiculate, obtuse, exceeding the obtuse ovate-oblong reflexed sepals; filaments often petaloid and abortive; ovaries free, distinct below the middle.—On the northwest coast from Behring Strait to Sitka, and in the Rocky Mountains southward to Oregon and California. East Humboldt Mountains, Nevada, and the Uintas; 8–9,000 feet altitude; July, August. (360.)

SAXIFRAGA FLAGELLARIS, Willd. Perennial, glandular-pubescent; stems ½–6′ high, simple, leafy, 1–5-flowered; stolons from the axils of the radical leaves long and filiform, naked, rooting at the extremity; leaves obovate-spatulate, ciliate, the lower much crowded, the upper oblong or linear; sepals very glandular, united at base, and slightly coherent with the ovary; petals persistent, yellow, 3–4″ long, exceeding the capsule.—Arctic America from Greenland to Behring Strait, and on the summits of the Rocky Mountains to Colorado. On the Uintas; 11,000 feet altitude; August. (361.)

TELLIMA[1] PARVIFLORA, Hook. Scabrous-hirsute; leaves ternately divided or lobed, the segments 3-cleft; pedicels suberect, usually shorter than the calyx which is obconic, elongating in fruit, and densely glandular-hirsute; petals much exserted, deeply 5-cleft with narrow segments; ovary adnate above the middle; seeds oblong, minutely roughened.—Root more or less granulate; stems 6–15′ high, with 1-2 leaves, 4–8-flowered, occasionally

[1] TELLIMA, BROWN. Calyx campanulate, dilated, prolonged beyond the ovary and adherent to it at base, 5-toothed or cleft, valvate. Petals 5, entire or divided, inserted on the throat of the calyx with the 10 small included stamens. Ovary half-superior, conical, 1-celled, with 2–3 parietal many-ovuled placentæ; styles 2–3, short. Capsule wholly or half inferior, membranous, 2–3 valved, many-seeded.—Erect simple pilose or glandular herbs, with petioled rounded-cordate lobed leaves and terminal racemes. The section *Lithophragma* is distinguished by a turbinate 5-lobed calyx, unguiculate 3-lobed or pinnatifid petals, and minute seeds. BENTH. & HOOK.

bulb-bearing; leaves ½–2′ in diameter; petals white, projecting 1–3″ beyond the calyx. The seeds are described as smooth, but in these specimens are minutely muriculate. From Washington Territory to Northern California, and in the Rocky Mountains of Colorado. Found in the West Humboldt, Toyabe, and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–10,000 feet altitude; May–August. (362.)

Tellima tenella, Hook. & Benth. (*Lithophragma*, Nutt.) Root and stem with often numerous bulblets; glandular-hirsute; leaves ternately divided, the segments 3-cleft; pedicels about equaling the campanulate calyx; calyx adherent to the base of the ovary, lobes pubescent within; petals pink or white, irregularly 5–7-lobed, lobes linear, acute; seeds small, oval, smooth.—Smaller than the last in every respect; stems 2–10′ high and about 3–5-flowered; leaves ¼–1′ in diameter; petals 2″ long; bulblets usually numerous and often taking the place of flowers in the raceme. There can scarcely be a doubt that this is Nuttall's species, described from very poor and scanty specimens. Collected by him in Southwestern Wyoming, by Burke in Southern Idaho, and by Ives in Western Arizona; it is also 413 Frémont (1846) and 62 Anderson. Frequent in the Washoe and West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–9,000 feet altitude; April–August. (363.)

Mitella pentandra, Hook. Leaves radical, on glabrous petioles, cordate, slightly lobed, crenately serrate, glabrous or sparingly hairy; scape slender, 6–12′ high, naked, glandular-pubescent above; calyx spreading, adherent to the ovary; stamens 5, nearly sessile, opposite to the pectinate-pinnatifid greenish petals; stigmas 2-lobed; capsules opening prematurely.—Rocky Mountains in latitude 52–56° (Drummond) and in Colorado, and the Cascade Mountains, Washington Territory. Found in the East Humboldt Mountains, Nevada, at 9,000 feet altitude, and in the Wahsatch, at 5,000 feet, in August and May respectively, in bloom. (364.)

Mitella trifida, Grah. Minutely pubescent; leaves nearly glabrous, radical, cordate, slightly lobed, crenate; scape slender, 1–1½° high, naked; calyx campanulate, with spreading somewhat colored lobes, adherent to the middle of the ovary; petals white, linear or filiform, deeply 3-cleft, exceeding the calyx; stamens 5, with very short filaments, alternate with the petals; stigma entire; capsule opening prematurely.—Collected by Douglas and

Drummond in the Rocky Mountains, latitude 46–56°. Not rare in the Wahsatch; 5–9,000 feet altitude; May–July. (365.)

HEUCHERA RUBESCENS, Torr. *Stansb. Rep., p.* 388, *t.* 5. Scape usually naked, glabrous or somewhat scabrous; leaves nearly glabrous, suborbicular, cordate at base, slightly lobed, crenate-dentate, the teeth setosely mucronate or obtuse, ciliate; panicle narrow and loosely many-flowered; bracts linear, often toothed, shorter than the pedicels; calyx campanulate or somewhat turbinate, pubescent, more or less colored, the equal segments oblong and obtuse, erect, shorter than the linear petals; stamens and styles exserted. —Scapes 8–15′ high, with rarely 1–2 small ovate leaflets; leaves 1–2′ broad; flowers 2–3″ in length, the calyx varying somewhat in shape, and the segments more or less rose-colored or white; the whole panicle often somewhat reddish. It differs from *H. sanguinea*, Eng., in the exserted stamens, style, and petals. First collected on Stansbury Island in Salt Lake; afterwards in New Mexico and California. Found in the East and West Humboldt Mountains, Nevada, and in the Wahsatch; 5–9,000 feet altitude; May–July. (366.)

HEUCHERA CYLINDRICA, Dougl. Scape elongated, naked, very villous below or hirsute with fulvous hairs, as also the petioles and veins of the leaves beneath; leaves roundish-cordate, glabrous above, 5–7-lobed, lobes obtuse, mucronate-crenate; panicle spicate, cylindrical; bracts scarious, laciniate-fimbriate; calyx campanulate, with erect somewhat unequal lobes; petals minute or none; filaments and styles very short, subulate, included.—Scape 2–3° high; leaves small. On stream-banks and hillsides, Oregon. Var. ALPINA. Low, 6–10′ in height, glandular-hirsute throughout, not villous; leaves small, 9″ broad; spikes short, 1′ in length. Clover Mountains, Nevada; 11,000 feet altitude; September. Specimens of the larger form, collected by Lyall on the northern boundary, have the same general glandular pubescence without fulvous hairs. (367.)

HEUCHERA PARVIFOLIA, Nutt. Scabrous-puberulent; scape naked leaves roundish-cordate, crenately 5–7-lobed, at length glabrous, ciliate; the lobes short and rounded, with 1–2 slight crenations or sometimes crenately serrate; panicle racemose, rather loose; bracts small, laciniate-ciliate; flowers small; calyx adherent to the ovary, obconic at base, with equal dilated or rotate limb; petals minute, fugacious; filaments and styles very short, not equaling the calyx; seeds hispid.—Scape 6′–2° high; leaves 1–2′ broad; flowers greenish; panicle somewhat crowded and spicate in the smaller

specimens. In the Rocky Mountains of Colorado and New Mexico (Bigelow) and in the Blue Mountains of Oregon. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch; 5–9,000 feet altitude; May, July. (368.)

PARNASSIA PARVIFLORA, DC. Sterile filaments in these specimens often 9, rarely as few as 5, occasionally none; leaves with a somewhat cordate tendency, the cauline often ovate, clasping; flowers 6–10″ in diameter. Hardly distinct from *P. palustris.* Rocky Mountains of British America, latitude 52–56°, and of Colorado, (Gunnison, and Hall & Harbour;) Wisconsin, (Gillman.) Huntington and Ruby Valleys, Nevada, and in the Wahsatch; 6,000 feet altitude; July, August. (369.)

PARNASSIA FIMBRIATA, Banks. Petals nearly sessile, fimbriate at base, twice longer than the calyx; sterile filaments 5–9 in each set, or reduced to a crenately-toothed broadly cuneate fleshy carinate scale; radical leaves long-petioled, reniform, the cauline small, cordate, sessile above the middle of the scape.—Scape 6–18′ high; flowers 1′ in diameter. Rocky Mountains of Colorado, Wyoming and British America to latitude 56°; California, (Brewer.) East Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 7–10,000 feet altitude; August, September. (370.)

JAMESIA[1] AMERICANA, T. & G. Cymes about equaling the leaves, 5–10-flowered; petals white, 3–4″ long, hairy within; calyx-lobes shorter than the petals, enlarging and becoming foliaceous in fruit.—Rocky Mountains of Colorado and New Mexico. Found in a shaded rocky gulch of the American Fork Cañon in the Wahsatch Mountains, Utah; 7,000 feet altitude; August. (371.)

RIBES HIRTELLUM, Mx. The half-dozen specimens are exactly like 151 Parry from Colorado, except that they are perfectly glabrous with but a few scattered hairs on the petioles. 1756 Brewer, of the California collection, is the same and equally glabrous. From New England to Illinois and northward to Hudson's Bay and the Saskatchewan; Colorado, and north-

[1] JAMESIA, T. & G. Calyx-tube very short, turbinate, adnate to the base of the ovary; lobes triangular-ovate, sometimes bifid. Petals 5, obovate, convolute. Stamens 10, the alternate ones shorter; filaments linear, flattened, acuminate. Ovary conical, 1-celled, with 3-5 parietal many-ovuled placentæ; styles 3–5, equaling the stamens. Capsule included, incompletely 3–5-celled, dehiscent between the persistent divergent styles. Seeds horizontal, ovate, shining, striate-reticulate, the embryo in the axis of the fleshy albumen.—A low diffusely branching shrub, 2–3° high; leaves opposite, petioled, ovate, mucronately serrate, canescent beneath, as well as on the petioles, calyx and branchlets, with a soft hairy pubescence; flowers cymose, in terminal panicles. BENTH. & HOOK.

ward in the Rocky Mountains; California. In the East Humboldt Mountains, Nevada, and in the Wahsatch; 7,000 feet altitude; June–September. (372.)

Ribes irriguum, Dougl. Branches naked or prickly; subaxillary spines 3, or sometimes more, stout, rarely reflexed; leaves roundish, 5-lobed, cuneate, truncate or subcordate at base, crenately serrate, nearly glabrous, somewhat hairy between the veins beneath and ciliate; peduncles slender and usually elongated, 3-flowered, glabrous, the bracts somewhat glandular-ciliate; calyx cylindrical and narrow (with the ovary often ½′ long,) glabrous, the segments linear-oblong, exceeding the tube, sometimes reflexed; the petals short, oblong-spatulate; the stamens usually exceeding the calyx but shorter than the deeply cleft style, filaments and style hairy; fruit rather large, smooth, deep-purple, edible.—Stems 6° high, branches red; leaves 1–1½′ in diameter; flowers purplish white. The above description is drawn from a large number of specimens. From New Mexico (353 Fendler) and Colorado (James) to Oregon (330 Geyer) and California (1756 Brewer;) also collected by Frémont on the Sweetwater and by Stretch in Washoe Valley. Abundant on stream-banks in the West Humboldt Mountains, Nevada; 5,000 feet altitude; flowering in June, fruit ripe in September and October. (373.)

Ribes leptanthum, Gray. *Plant. Fendl., p.* 53. Without prickles; the subaxillary spines solitary, (rarely 2–3,) stout; the dense minute pubescence glandular and often mixed with resinous dots or the whole plant glabrous; leaves small, numerous, 5-cleft, lobes incised; peduncles short, deflexed, with 1–2 yellow flowers; calyx tubular or somewhat campanulate, more or less silky-pubescent, the lobes sub-spatulate, often reflexed, equaling the tube and about twice longer than the stamens and petals; style glabrous, undivided, stigmas two; fruit unarmed, glabrous.—Low (2–3° high) and diffusely branched; leaves usually 4–6″, sometimes 1′ broad; flowers 2–4″ long. Collected by James and also by Frémont (254, 1844, and 372, 1846) and frequently since; New Mexico, Colorado and California. Frequent on the Washoe and Trinity Mountains, Nevada, and also found at Black Rock, at the southern end of Salt Lake; 4,300–6,000 feet altitude; April, May. (374.)

Ribes lacustre, Poir. Racemes 6–7-flowered; fruit nearly smooth; leaves 1½′ in diameter. New England to Pennsylvania and Wisconsin, northward to the Arctic Circle and west to Washington Territory and Alaska;

Colorado (Vasey.) Found in the Uinta Mountains; 8,000 feet altitude; August. (375.)

Var. A more alpine form, with small leaves, ½–1′ broad, glabrous or somewhat glandular-pubescent, the racemes short, 3–5-flowered; fruit hispid; the younger branches often very prickly. This, according to Dr. Gray, is the *R. setosum* of Douglas from the Saskatchewan. Frequent in the Rocky Mountains of Colorado and collected by Prof. Brewer in the Sierras of California. In the East Humboldt Mountains, Nevada, and in the Uintas; 9–10,000 feet altitude; July, August. (376.)

Ribes prostratum, L'Her. Leaves about 2′ in diameter; racemes short and few-flowered. New England to Pennsylvania and Wisconsin, north to latitude 57° and west to the Pacific Coast from Washington Territory to Sitka; Rocky Mountains of Colorado. Wahsatch Mountains; 9,000 feet altitude; July. (377.)

Ribes bracteosum, Dougl. Unarmed, glabrous; leaves on long petioles, cordate, deeply 5–7-lobed, sprinkled with resinous dots beneath, the lobes acuminate, coarsely doubly serrate or incised; racemes long, erect, many-flowered, on short peduncles; calyx rotate, glabrous; flowers white; fruit black, resinous-dotted and scarcely eatable.—Stems 4–8° high, rather weak; leaves often large, 3–7′ broad; the elongated fruiting racemes 4–10′ long. Nearly allied to the last but distinguished by the longer nearly sessile racemes of numerous flowers, the glabrous fruit, and the larger, more sharply serrate leaves. On the western coast from Sitka to California (Bolander.) In the East Humboldt Mountains, Nevada, and in the Wahsatch; 6–7,000 feet altitude; in flower, May; in fruit, August. (378.)

Ribes cereum, Dougl. Unarmed; leaves roundish, mostly cordate, 3–5-lobed, incisely crenate, viscid-pubescent or nearly glabrous, often resinous-dotted; racemes nodding, on short peduncles, crowded, 3–5-flowered; bracts ovate, appressed to the nearly sessile ovary; calyx tubular, glandular, the segments very short, recurved; petals minute, orbicular; stamens included; style undivided; stigmas two; fruit globose, usually somewhat glandular.—A diffusely branching shrub, 1–3° high; leaves ½–1′ broad; calyx 3–4″ long, pinkish white; peduncles rarely ½′ long; fruit light-red, sweet, somewhat resinous. The amount of the resinous secretion upon the plant varies nearly with the elevation of the locality. From Washington Territory and California to Colorado and southward in New Mexico. Fre-

quent on the mountains throughout Nevada and Utah, from their base to nearly the highest peaks; 5–11,000 feet altitude; May–September. (379.)

RIBES VISCOSISSIMUM, Pursh. Unarmed, viscid-pubescent; leaves cordate, roundish, obtusely 3–5-lobed, the lobes short, rounded, doubly crenate-serrate; racemes suberect, somewhat corymbed; bracts conspicuous, spatulate, nearly equaling the glandular pedicels; calyx campanulate, the greenish-yellow segments rather shorter than the tube; style 2-cleft at the apex; fruit ovoid, black, viscid-pubescent.—Stems 3° high, rather weak, growing on shaded mountain slopes; flowers large, ½′ long above the ovary. Rocky Mountains of Idaho. In the Wahsatch and Uintas; 8–9,000 feet altitude; June–August. (380.)

RIBES SANGUINEUM, Pursh. Unarmed, glandular-puberulent or more or less tomentose; leaves cordate, 3–5-lobed, doubly serrate, subglabrous above; racemes puberulent and glandular, exceeding the leaves, loosely many-flowered; pedicels about the length of the flowers, rather shorter than the ovate-spatulate bracts; calyx tubular-campanulate, the segments ovate or oblong, obtuse, reflexed, longer than the petals; style more or less bifid; fruit subglobose, somewhat glandular-hirsute, destitute of pulp.—A variable species, doubtless including *R. glutinosum*, Benth., and perhaps also *R. malvaceum*, Sm., which, however, has the leaves strigose-hirsute above, the racemes shorter and more dense, and the style and interior of the calyx-tube hairy. The calyx is 3–5″ in length and with the bracts usually of a deep rose-color. Frequent from Washington Territory through California. Var. VARIEGATUM. Nearly glabrous throughout, with the petioles and peduncles glandular-puberulent, and the ovary somewhat glandular-hispid; flowers in short dense racemes, the pedicels about equaling the ovate reddish bracts; calyx campanulate, the tube very short, scarcely equaling the ovate deep rose-red segments; petals white, rounded, short; style deeply bifid.—Possibly a distinct species, but probably only an extreme form of *R. sanguineum* in those respects in which that species is most variable—pubescence, form of the calyx, and denseness of inflorescence. None of the specimens are yet in full flower. A branching shrub, 2–3° high; Washoe Mountains, near Carson City, on stream banks; 5,000 feet altitude; April. Collected also by Dr. Anderson. (381.)

RIBES AUREUM, Pursh. Unarmed, glabrous; leaves convolute in vernation, rather thick, 3-lobed, lobes divaricate, incisely few-toothed, ciliate when

young and the petioles with the peduncles minutely puberulent; raceme many-flowered, with foliaceous bracts exceeding the pedicels; calyx yellow, tubular, long and slender, the segments spreading, much shorter than the tube, about twice the length of the petals; style undivided; fruit glabrous, yellowish-red, turning darker, edible.—From New Mexico and Kansas to Washington Territory and the Saskatchewan, (Bourgeau.) Frequent on stream banks in northern Nevada and in the Wahsatch; 4,500–6,000 feet altitude; flowering in May; fruit ripe in July. (382.)

## CRASSULACEÆ.

TILLÆA ANGUSTIFOLIA, Nutt. Branching from the base, rooting; leaves linear-lanceolate, acute, connate, 1½″ long; flowers axillary, solitary, on short pedicels; sepals 4, ovate, not half the length of the oblong white petals; carpels broad, obtuse, 8-seeded; style none, stigma minute; seeds nearly horizontal, linear-oblong, minutely tuberculate in longitudinal rows.—Stems 1–2′ high. Collected by Nuttall on the Columbia and Wallamette. Found on the muddy banks of Goose Creek in Northeastern Nevada. (383.)

SEDUM RHODIOLA, DC. Stems 4–6′ high; flowers of a deep maroon color, occasionally perfect with 10 stamens and 5 pistils.—Pennsylvania, Maine, Newfoundland and Labrador, Greenland, the Arctic Coast to Behring Strait, in the Rocky Mountains southward to New Mexico, and in the Californian Sierras, (Brewer.) East Humboldt Mountains, Nevada; 9–10,000 feet altitude; August, September. (384.)

SEDUM RHODANTHUM, Gray. *Amer. Jour. Sci., n. s.,* 33. 405. Stems numerous from a thick root, simple; leaves flat, scattered, glabrous, oblong or oblanceolate, entire; corymb terminal, simple; flowers perfect, mostly tetramerous, more than twice the length of the pedicels; sepals linear, petals rose-color or nearly white, lanceolate, acuminate, twice exceeding the sepals and a little longer than the stamens, which are adnate to them below the middle; ovaries straight; styles filiform.—Stems ½–1° high, with crowded corymbs, 1–2′ long, of large (4–5″) flowers; leaves 1–2″ in length; on stream banks. Rocky Mountains of Colorado. Uinta Mountains, Utah; 9,000 feet altitude; August. (385.)

SEDUM STENOPETALUM, Pursh. Glabrous; stems several, erect from a decumbent base; simple or somewhat branched; leaves numerous, crowded

upon the barren shoots, very fleshy, lanceolate, sessile, acute; cyme much branched, scorpioid and expanding; flowers bright yellow, nearly sessile, pentamerous; petals linear-lanceolate, acuminate, twice longer than the subulate sepals.—Stems 3–6′ high; leaves 2–4″ long; flowers large and showy, 3 4″ long; growing on dry slopes. Cascade Mountains, Oregon, (Newberry,) and both sides of the Rocky Mountains from latitude 55° to Colorado. Toyabe and East Humboldt Mountains, Nevada, and in the Wahsatch; 6–8,000 feet altitude; June–September. (386.)

Sedum debile. Glabrous; stems weak, decumbent or suberect, numerous from slender clustered rootstocks, simple or somewhat branched; leaves small, sessile, scattered, crowded upon the barren shoots, very fleshy, flattened, roundish, entire; cyme subtrichotomous, spreading, few- (3–15-) flowered; pedicels about equaling the ovate sepals; petals yellow, lanceolate, acuminate, twice longer than the sepals; stamens 10, or fewer by abortion, attached near the base of the petals; styles 5, slender.—Stems 1–4′ high; leaves 1–2″ in diameter; flowers 3″ long. Nearest *S. sparsiflorum*, Nutt., (which includes *S. Torreyi*, Don.;) marked by its weak decumbent stems, its few pedicelled flowers and rounded leaves. Found on rocky ridges on the East and West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–10,000 feet altitude; May–September. (387.)

## HALORAGEÆ.

Hippuris vulgaris, L. New York to Kentucky, rare; throughout British America to Greenland and Behring Strait; California, New Mexico, (Fendler,) and Colorado, (Hall & Harbour.) Humboldt Valley below Centerville, Nevada, and in the Wahsatch; 5–6,000 feet altitude. (388.)

Myriophyllum verticillatum, L. From Florida to Canada; on the Saskatchewan, (Bourgeau;) Oregon, (Nuttall;) Nebraska, (James;) Texas. Found in Ruby Valley, Nevada, and in the Uintas; 6–8,000 feet altitude; August, September. (389.)

Callitriche verna, L. From New Jersey and Pennsylvania to Canada, Minnesota, (Nicolet,) and the Saskatchewan; California. Ruby Valley, Nevada, and the Uintas; 6–8,000 feet altitude; August, September. (390.)

Var. terrestris, Gray. The terrestrial form, with smaller and narrower leaves. In the Wahsatch and Uintas; 6,000 feet altitude; July. (391.)

Callitriche autumnalis, L. From northern New York and Lake

Superior to Hudson's Bay and the Arctic Circle. In the Wahsatch Mountains, Utah; 6,000 feet altitude; July. (392.)

## LYTHRACEÆ.

Ammannia latifolia, L. From Ohio to Missouri, thence to Louisiana, the Indian Territory, Western Texas, Northern Mexico, and California. Found in Carson Valley, Nevada; 4,500 feet altitude; August. (393.)

## ONAGRACEÆ.

Epilobium alpinum, L. Northern New York and in the White Mountains; Arctic America from Greenland to Alaska; in the Rocky Mountains southward to Colorado; Cascade Mountains, Oregon; Sierras of California. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 8–9,000 feet altitude; July, August. (394.)

Epilobium tetragonum, L. Stems erect, usually branching, 4-sided, glabrous or nearly so; leaves opposite, oblong-lanceolate, acute, denticulate, the middle ones more or less decurrent along the angles of the stem, the lower somewhat petioled; petals emarginate; stigma clavate; capsules pedicelled, minutely pubescent.—Stem 6′–2° high, angled by the slight decurrence of the leaf, the adjacent angles often confluent into a single line and sometimes nearly obliterated. Some of the specimens appear to be just as good *E. coloratum*, but in the want of any clear line of distinction, all are placed together. Canada to latitude 64° and west to the Pacific, Oregon, and California; Colorado, (Parry.) Frequent in the mountains near water through Nevada and in the Wahsatch; 4,500–8,000 feet altitude; June–September. (395.)

Epilobium paniculatum, Nutt. Glabrous, or glandular-pubescent above; stem erect, slender, terete, dichotomous above; leaves narrowly linear, obscurely serrulate, acute; attenuate at base, mostly alternate and fascicled; flowers few, terminating the spreading filiform and almost leafless branches; calyx-tube infundibuliform; petals, obcordate, nearly twice exceeding the calyx-lobes; capsules short, acute at each end, straight or a little curved, erect or spreading.—Stems 3′–3° high; flowers 1–4″ long, light rose-color; capsules ½–1′ in length; sometimes glabrous throughout. From Washington Territory to Sacramento Valley and eastward to Colorado. Frequent in the

mountains of Nevada and in the Wahsatch; 4,500–7,000 feet altitude; May–September. (396.)

EPILOBIUM ANGUSTIFOLIUM, L. In the mountains of North Carolina and northward; Greenland and throughout British America to Behring Strait and the Pacific, southward to California and in the Rocky Mountains to New Mexico, (Fendler.) In the West Humboldt Mountains, and Ruby Valley, Nevada, and in the Wahsatch; 6–8,000 feet altitude; July–September. (397.)

EPILOBIUM OBCORDATUM, Gray. *Proc. Amer. Acad.*, 6. 532. Dwarf, glabrous; stems decumbent, 1–5-flowered; leaves opposite, sessile, broadly ovate or oval, somewhat denticulate, glaucous; buds nodding; calyx-tube produced beyond the minutely puberulent ovary, infundibuliform, about half shorter than the broadly lanceolate lobes; petals large and of a bright rose-color, obcordately 2-lobed, spreading; style exceeding the stamens, declined; stigma shortly 4-lobed; capsule clavate-oblong, pedicellate.—Alpine; stems 3–5′ long, from a much branched woody rootstock; leaves somewhat crowded, ½′ long; petals ½′ in length. Sierras of California. East Humboldt and Clover Mountains, Nevada; 10,000 feet altitude; August, September. (398.)

ZAUSCHNERIA[1] CALIFORNICA, Presl. Canescently and somewhat villously pubescent; stems decumbent, 1–2° long; leaves oblong or linear-lanceolate, entire or denticulate, the lower ones opposite; flowers 1′ in length, petals deep-red, calyx lighter.—Very variable in its foliage; the specimens have mostly ovate or oblong leaves, 1–1½′ long. Southern and Lower California, Arizona and Sonora. Wahsatch Mountains, Utah; 5–6,000 feet altitude; July, August. (399.)

CLARKIA[2] RHOMBOIDEA, Dougl. Stems 1–3° high, sparingly branched,

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[1] ZAUSCHNERIA, PRESL. Calyx-tube linear, 4-angled, suddenly expanding above the ovary into a deciduous clavate-funnelform 4-lobed limb, globose at base and with 8 scales below the middle, 4 of which are deflexed. Petals 4, on the throat of the calyx, obovate, 2-lobed. Stamens 8, the alternate shorter, with filiform filaments; anthers linear-oblong. Ovary 4-celled; style elongated, filiform, with a capitate 4-lobed stigma; ovules numerous, in one row upon the inner angles of the cells. Capsule linear, imperfectly 4-celled, 4-valved, the valves free from the axis; seeds oblong, attached to the axis, tufted with long hairs at the apex.—A low branched perennial, with sessile leaves and large solitary axillary sessile flowers. BENTH. & HOOK.

[2] CLARKIA, PURSH. Calyx-tube linear, 4-angled, slightly produced above the ovary; limb funnelform, 4-parted, deciduous. Petals 4, unguiculate, dilated, entire or 3-lobed, the claw 2-toothed. Stamens 8, on the throat of the calyx, the alternate ones shorter, with filiform filaments; anthers oblong or linear, at length revolute, those of the shorter stamens smaller or abortive. Disk annular, surrounding the base of the style. Style filiform, with a broad cruciately 4-lobed stigma. Capsule linear, narrowed above, 4-celled, 4-valved to the middle, the numerous ascending papillose seeds in one row upon the axillary placentæ.—Annual branching virgate herbs, with alternate leaves and rather large flowers. BENTH. & HOOK.

fragile; leaves 1–2′ long, ovate or oblong, on slender petioles; petals deep-purple, 2–4″ long, rhomboidal, with a short claw, undivided; stamens all fertile, with a villous scale at the base of each; stigmas short and hairy; capsules 1′ in length, on short pedicels, nearly glabrous.—Oregon and Northern California. Found in the Havallah range, Nevada, and frequent in the Wahsatch; 5–6,000 feet altitude; June, July. (400.)

GAYOPHYTUM[1] RAMOSISSIMUM, T. & G. Glabrous, divaricately branched; flowers very minute; calyx-lobes lanceolate-oblong, equaling the rose-colored petals and exceeding the longer stamens; capsules oblong, 3–5-seeded, rather shorter than the filiform pedicels.—Stems 6–18′ high, becoming very much branched. Readily distinguished by the short pods (2–3″ long) on pedicels of about the same length, which are often deflexed; flowers ½″ long. Rocky Mountains, from Southern Idaho to Colorado. Frequent from Western Nevada to the Wahsatch; 5,000 feet altitude; May–July. (401.)

GAYOPHYTUM RACEMOSUM, T. & G. Nearly glabrous, branched, the branches elongated, mostly simple; flowers as in the last, axillary along the branches; capsules linear, tapering at base into a very short pedicel or sessile, many-seeded.—Glabrous or with a minute fugacious pubescence upon the young capsules; stems 6–18′ high; capsules 8–10″ long, sometimes only 8–12-seeded. Distinguished from the last by its longer many-seeded nearly sessile pods and more simple branches. This species includes *G. Nuttallii*, T. & G. Rocky Mountains of Idaho and Colorado; California, (Bolander.) Pah-Ute range and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–7,500 feet altitude; June–August. (402.)

Var. A reduced mountain form, 1–6′ high, simple or branched, few-flowered, glabrous or clothed with a dense short appressed pubescence. The latter resemble Oregon specimens collected by Cronkhite, and are equivalent to *G. cæsium*, T. &. G., which differs from *G. racemosum* only in its pubescence. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch; 7–10,000 feet altitude; July–September. (403.)

GAYOPHYTUM DIFFUSUM, T. & G. Nearly glabrous, somewhat pubescent

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[1] GAYOPHYTUM, A. JUSS. Calyx-tube not produced beyond the ovary, linear, subterete; lobes 4, spreading, deciduous. Petals 4, obovate, very shortly unguiculate. Stamens 8, or 4 alternate with as many staminodia; filaments short, filiform; anthers globose. Style rather short, with a capitate or clavate stigma. Capsule small, membranous, linear, 2-celled, 4-valved, two opposite valves bearing a narrow dissepiment. Seeds few-many, in a single series in each cell, ascending.—Annual slender branching herbs, with alternate linear entire nerveless leaves and small axillary solitary flowers. BENTH. & HOOK.

above; stems divaricately branched, 6–18′ high, flowers mostly toward the extremities of the branches, rather large, the petals exceeding the calyx; stamens usually all fertile, the shorter varying in length and in the size of their anthers; style longer than the stamens, with a capitate or subclavate stigma; capsules oblong or linear, a little longer than the pedicels.—Flowers 1½–3″ in diameter; capsules frequently deflexed, 3–6″ long; cells 4–8-seeded. Much resembling *G. ramosissimum*, but distinguished by its larger flowers and longer capsules. It differs somewhat from *G. diffusum* as described, but the characters of the anthers and stigma are quite variable, and flowers may be found that accord well enough with the original. Idaho, Oregon, (Cronkhite,) and California, (4922 and 6371 Bolander, 1414 Brewer.) Havallah Range and East and West Humboldt Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; June–September. (404.)

Œnothera biennis, L. Stems 2–3° high; minutely pubescent, the calyx somewhat silky; spike crowded; petals 6″ in length; leaves lanceolate, the lower cauline 6′ by 1′. Throughout North America from latitude 56° to Florida, Arkansas, New Mexico, Arizona and California. Wahsatch Mountains, Utah; 6,000 feet altitude; August. (405.)

Var. grandiflora, T. & G. Spike less crowded and with fewer flowers; petals 1–1½′ long, nearly equaling the tube; leaves narrowly lanceolate, the lower 3′ long by ½′ wide. Through Nevada and Utah, much more common than the last; 4,500–6,000 feet altitude; June–September. (406.)

Œnothera coronopifolia, T. & G. Perennial, with horizontal rootstocks; stems simple, often numerous from a branching base, erect or ascending, slender, canescently puberulent, strigose or hispid; basal leaves linear-spatulate, the rest pectinately pinnatifid; throat of the calyx-tube densely villous; petals somewhat orbicular, entire, equaling the stamens, shorter than the pistil; capsule ovate- or linear-oblong, torulose at base, sometimes attenuate into a very short peduncle, suberect; seeds large, ovate, turgid, somewhat obtuse or obliquely truncate, costate-tuberculate.—Stems 6–18′ high; petals nearly white, turning red, ½′ long; capsules ½–1′ in length. From Northern Arizona and New Mexico to the Platte. In the Wahsatch and Uintas; 6,000 feet altitude; July. (407.)

Œnothera albicaulis, Nutt. Perennial, glabrous, puberulent or hirsute; bark of the stem white, membranous, shining; leaves very variable; petals round-ovate, more or less unguiculate, entire, exceeding the stamens

and equaling the pistil; capsule thickened at base, sessile, linear, divaricate, often flexuous or deflexed; seeds rather small, linear-lanceolate, smooth.—Stems usually 1–2° high, erect or ascending, from more or less running rootstocks. Var. NUTTALLII, Eng. *Amer. Jour. Sci., n. s.*, 36. 334. Leaves linear or lanceolate, attenuate at base into a short petiole, entire or more or less dentate, (some of the specimens with villous calyx and coarsely sinuate-dentate or subpinnatifid leaves, approaching Var. *runcinata*;) petals nearly white, 1′ in length, about equaling the calyx-tube; capsule 1–1½′ long; stems slender, simple or branching at base.—From Washington Territory to the Saskatchewan and southward, east of the Sierras, to Northern Mexico and Western Texas. Found in Smoky and Ruby Valleys, Nevada, but much more frequent in the Wahsatch; 5–6,000 feet altitude; June–August. (408.)

ŒNOTHERA DELTOIDES, Torr. & Frém. *Frémont's Rep.*, (1845,) *p.* 315. Annual, more or less canescently puberulent and villous; stem erect, low and stout, 6–10′ high, becoming woody with white membranous bark, sparingly branched, the branches subdecumbent; early flowering forms often nearly acaulescent; leaves tapering to a long petiole, very variable even on the same plant, from broadly rhombic-ovate to lyrate linear-pinnatifid; flowers large, (2–3′ in diameter,) sessile, axillary; calyx-lobes villous, the tube nearly twice longer than the entire petals; stamens shorter than the petals; anthers elongated, fixed by the middle; style exserted; capsule thickened at base, (often 2½′) long,) terete, usually recurved, rigid; seeds linear, smooth, varying in size, usually 1¼″ in length.—Root straight and subfusiform. This is 203 Anderson and 101 Torrey, from near Carson City, 1217 and 1590 Brewer, from California, and was also collected by Cooper near Fort Mohave in Western Arizona. It has been mistaken for Var. *trichocalyx* of the last species, but is very different. Foot-hills of the Truckee and Humboldt Valleys, Nevada; 5,000 feet altitude; May, June. (409.)

ŒNOTHERA TRILOBA, Nutt. Biennial, acaulescent, nearly glabrous; leaves runcinate-pinnatifid, petioled, the segments occasionally toothed; flowers large, sessile; calyx-tube very long, (2–5′,) filiform, dilated above; capsules oval or obovate, cartilaginous or somewhat woody, reticulated, 4-winged, apiculate or 4-toothed at the apex, tardily dehiscent loculicidally or sometimes septicidally; seeds horizontal, angled, densely tuberculate.—Leaves thin, 4–10′ long; flowers 2–3′ in diameter, yellowish, becoming rose-color; capsules 1′ in length, persistent and crowding at the base. From Arkansas to

Northern Chihuahua, New Mexico and Colorado; Saskatchewan, (Bourgeau.) Truckee Valley and West Humboldt Mountains, Nevada; Wahsatch and Uintas; 5–8,000 feet altitude; May–July. (410.)

Œnothera marginata, Nutt. Perennial (?,) acaulescent or with a short suberect stem, (2–6′ high,) more or less villous-pubescent or nearly glabrous; leaves petioled, lanceolate, acute, variable in section, runcinate, lyrate, repandly toothed, or nearly entire; calyx-tube elongated, (3–5′;) petals large, 1–2′ long, obcordate, nearly white, becoming rose-color; capsules sessile or upon short peduncles, coriaceous, oblong, somewhat attenuate above, straight or curved, sub-4-angled, more or less ribbed, with the ridges tuberculate or smooth; dehiscence loculicidal; seeds nearly horizontal, obovate, smooth, sulcate.—This species must include *Œ. cæspitosa* and *montana* of Nuttall, as neither the pubescence, shape of the leaves, length of the calyx-tube and pedicels, nor form of the capsule, affords any constant distinctions. *Œ. eximia*, Gray, is probably but a luxuriant, more than usually caulescent form; as yet collected only with very immature fruit. Specimens of undoubted *marginata* approach it in size. From Wyoming and Colorado to the Sierras; New Mexico, (Thurber.) Foot-hills through Nevada and around Salt Lake Valley; 5,000 feet altitude; May, June. (411.)

Var. purpurea. A subalpine form; canescent with a minute pubescence; leaves lanceolate, acute, or ovate and obtuse, entire or slightly denticulate; the calyx and corolla more or less purplish, even before opening. East Humboldt Mountains, Nevada; 8–10,000 feet altitude; July, August. (412.)

Œnothera viminea, Dougl. Annual, nearly glabrous, glaucous; stems 2 3° high, ascending or erect, branched; leaves lanceolate, almost entire, nearly sessile; calyx-tube funnelform, about equaling the segments; petals lilac or rose-color, 7–8″ long, exceeding the stamens; filaments flat, unequal; style exserted; stigma-lobes short, oval, purple; capsules sessile, cylindrical, 1′ long or more, slightly 4-sided, tapering to the apex, canescently puberulent; seeds ascending, in a single series, with a membranous border.—California. Collected by Stretch in Western Nevada.

Œnothera glabella, Nutt. Annual, glabrous or nearly so; stems erect, simple, or branched at base; leaves sessile, lanceolate or ovate-lanceolate, acuminate, serrulate; flowers very small, purple, axillary, sessile, solitary or 2–5 together; calyx-tube funnelform, shorter than the rather erect

segments; petals 2-lobed, erect-spreading; capsules cylindrical, tapering above, striated, submembranous, the valves septiferous; seeds oblong, smooth, few (4–6) and in a single series in each cell.—Stems 6–12′ high, slightly pubescent in these specimens, as also the solitary capsules; flowers ½–1″ and capsules 3–4″ long. *Œ. densiflora*, Lindl., as recognized, is so exceedingly variable that this comparatively glabrous small-flowered form might perhaps be also included. But the septiferous valves, the very short calyx-tube and the entire absence of tomentum seem sufficiently distinctive. Carson River bottom, near Reed's Station, Nevada; July. (413.)

Œnothera scapoidea, Nutt. Annual, glabrous or somewhat pubescent; stems 3–18′ high, simple or branched at base; leaves mostly near the base of the stem, lyrate-pinnate, the terminal leaflet cuneate or cordate at base, lateral ones often obsolete, ovate or ovate-oblong, acute, denticulate or toothed, the upper leaves small, petioled, or wanting; raceme somewhat scorpioid, rather loosely flowered, elongating in fruit, with minute bracts; flowers pedicelled, rather small, yellow; calyx-tube funnelform, rather shorter than the ovate segments; petals 1–2″ long, obovate, entire; capsule clavate-cylindrical, somewhat membranous, 4-nerved, ½–1½′ long, exceeding the spreading pedicel; seeds obovate, ascending, smooth.—Described by Nuttall from very small specimens. Collected by him in the Rocky Mountains, (probably in Wyoming,) and also by Geyer, by Stansbury in Utah, and by Beckwith north of Pyramid Lake, Nevada. Found in the Truckee and Holmes Creek Valleys, Nevada, in the Wahsatch, and about Salt Lake; 4,500–6,000 feet altitude; May–September. (414.)

Var. clavæformis. (*Œ. clavæformis*, Torr. *Frém. Rep., p.* 314.) Flowers rather larger, petals 3–4″ long, pinkish-white, occasionally with a broad purple spot at the base of the petal, rarely yellowish.—The more frequent Nevada form. *Œ. cardiophylla*, Torr., is without doubt the same, and *Œ. brevipes*, Gray, can hardly be more than a form. California and Arizona. Frequent through Nevada from the Washoe to the Toyabe Mountains; 4,500–6,000 feet altitude; May–November. (415.)

Œnothera breviflora, T. & G. Perennial, acaulescent, somewhat pubescent; leaves petioled, 2–6′ long, lanceolate, acuminate, interruptedly pinnately parted, the segments lanceolate, acuminate, toothed or entire; calyx-tube marcescent, much shorter than the leaves, filiform, dilated at the summit, the segments lanceolate, shorter than the obovate yellow petals, but

exceeding the style; stigma capitate, entire; capsules large, sessile, submembranous, oblong and attenuate above, subtetragonal and sulcate on the sides, very many-seeded; seeds smooth, somewhat ascending, terete, oblong, slightly reniform, in 2 series in each cell.—Flowers numerous, small, scarcely 1′ long with the ovary, the petals 2–3″ in length; matured capsules large in proportion, nearly 1′ long, attenuated above into the persistent calyx-tube. 176 Hall & Harbour is the same. In the original description the segments of the leaves are said to be obtuse. *Œ. Nutallii*, with which this species has been united by Dr. Gray, is described as having acuminate leaf-segments, but at the same time larger flowers, with a tube 1–2′ long and a style exceeding the sepals—in these respects resembling the next—and subulate-conic terete capsules. Southern Idaho to Colorado. Wahsatch Mountains, shore of subalpine lake; 9,000 feet altitude; August. (416.)

Œnothera tanacetifolia, T. & G. *Pac. R. R. Surv.*, (*Beckwith's Rep.*,) 2. 121. Closely resembling the last and nearly according with the description of *Œ. Nuttallii*. Segments of the leaves usually somewhat rounded and sinuately toothed, sometimes acuminate; calyx-tube 1–1½′ long, the segments shorter than the petals (5–7″ long) and style; capsules, so far as known, (perhaps abortive,) linear or subulate, very few- (1–2-) seeded, the seed like that of the last, but slightly longer. Klamath Valley, (Newberry, Cronkhite;) mountains north of Pyramid Lake, Nevada, (Beckwith.) Found in the Truckee meadows, near Glendale, by W. W. Bailey; July. (417.)

Œnothera heterantha, Nutt. Perennial, acaulescent, glabrous; leaves 4–12′ long, thin, oblong-lanceolate, tapering into a slender petiole, entire, repand-denticulate or lyrate-pinnatifid; flowers 1′ in diameter; the calyx-tube 2′ long, filiform, dilated at the apex, the segments ovate-lanceolate, rather shorter than the broadly obovate retuse yellow petals, and longer than the style; stigma capitate; capsules 9″ long, sessile, ovoid-oblong, attenuate into the persistent calyx-tube, smooth and even, the valves with a slightly prominent midrib; seeds ovoid or oblong, minutely reticulate-pitted.—Idaho, (Wyeth and Geyer.) Found on wet creek banks in the Pah-Ute, Havallah and Toyabe ranges, Nevada, and in the Wahsatch; 6,000 feet altitude; June, July. (418.)

Œnothera Boothii, Dougl. Annual (?,) viscidly pubescent above; stem decumbent or ascending, ½–1° long, branched; leaves ovate, 6–18″ in length, acute or acuminate, denticulate-serrate, somewhat hirsute beneath,

pubescent or subglabrous above, petioled; flowers white or rose-colored, 6–8″ broad, numerous, in a crowded scorpioid spike; calyx viscidly hairy, the tube about equaling the ovary and the oblong acuminate segments; petals obovate, entire, rather shorter than the slightly unequal stamens and style; stigma subglobose; capsules 6–9″ long, sessile, viscid-pubescent or hirsute, tapering from near the base, somewhat striate, much curved; seeds 1″ in length, linear-oblong, ascending, in a single row.—Washington Territory, (Douglas and Nuttall.) Virginia and Lake ranges, Nevada; 6,000 feet altitude; August–November. (419.)

Œnothera alyssoides, H. & A. Annual, canescently puberulent, low, branched from the base; stems ascending; leaves oblong-lanceolate, attenuate into a petiole, denticulate or nearly entire, the upper ones becoming linear; spike many-flowered, unilateral, scorpioid; calyx-tube shorter than the ovary, about equaling the sepals and petals; petals orbicular, entire, rose-color or nearly white, a little shorter than the equal stamens and style; stigma capitate; capsules linear, nearly 1′ long, very slender, much contorted; seeds small, ½″ long, oblong, ascending, in one series, very minutely reticulate-pitted.—About 6′ high; basal leaves 1–2′ long, the cauline much smaller; flowers often quite showy, petals 2–3″ broad. California (Douglas) and Nevada; Southern Utah, (Palmer, 1870.) Frequent from the West Humboldt to the Toyabe Mountains and on the low ranges about Salt Lake; 4,500–6,000 feet altitude; May–September. (420.)

Var. (?) minutiflora. Stems ascending or decumbent; the cauline leaves often numerous and scarcely smaller than the lower ones; flowers very small, 1″ in diameter, axillary the whole length of the stems, the spike slightly circinate; calyx-tube many times shorter than the ovary, about equaling the segments; petals white, emarginate, shorter than the calyx-lobes; stamens very short, the longer filaments equaling the anthers; capsules ½–1′ long; seeds silvery white—It somewhat resembles but has none of the hirsuteness of *Œ. micrantha*, which has also broader and sessile leaves, yellowish flowers, turning green, and an ovate dark-colored seed. Found in Monitor Valley, Nevada, and upon Black Rock Point and Stansbury Island, Salt Lake; 4,200–5,500 feet altitude; June, July. (421.)

Œnothera dentata, Cav. Annual, canescently puberulent or nearly glabrous, low, branching from the base; stems ascending or decumbent; leaves linear, very narrow, remotely denticulate, attenuate at base; calyx-

tube obconic-funnelform, shorter than the segments, many times shorter than the ovary; petals 1–4″ long, yellow, becoming reddish, broadly obovate, nearly entire, rather longer than the style and stamens; stigma capitate; capsules sessile or on very short pedicels, linear, elongated, very narrow, somewhat curved; seeds very small, ovate, ascending, in one row, nearly smooth.—Stems 3′–1° in length; leaves ½–1′ long and ½″ broad; flowers very variable in size; capsule ½–1′ long, with the pedicel somewhat adnate to the petiole of the subtending leaf. This species doubtless includes *Œ. parvula* and *epilobioides* of Nuttall, *contorta*, Hook., *strigulosa*, T. & G., and probably *chamenerioides*, Gray. Oregon and Idaho to California and Arizona. In the Trinity Mountains and Monitor Valley, Nevada, and on Antelope Island, Salt Lake; 5,000 feet altitude; May–July. (422.)

Var. Canescent with a short hirsute pubescence; leaves linear-lanceolate, repandly toothed, sessile; capsules (immature) sessile. Found in the Washoe, West Humboldt and Pah-Ute Mountains of Western Nevada; 5–6,000 feet altitude; May, June. (423.)

Œnothera pterosperma. Annual, low, more or less hispid-pubescent; stem simple or branched, erect; leaves oblong-lanceolate, obtuse, entire; flowers axillary, pedicelled, small, pinkish-white; calyx-tube funnelform, shorter than the ovate segments and many times shorter than the ovary; petals obcordate, a little exceeding the calyx, and nearly twice longer than the longer stamens; capsules cylindrical-clavate, nearly straight, attenuate at base into a curved pedicel nearly one-half as long, membranous, erect; seeds oblong, ascending, in one series in each cell, flattened and the chalaza bordered with a spongy somewhat revolute thickening of the testa, minutely tubercled with cellular processes.—The specimens are all small, but 2–3′ high, the flowers few and small, with petals 1″ in length, the capsule ½–¾′ long on spreading pedicels; radical leaves entirely wanting. The character of the seed is unusual in this section. Growing under sage brush, Trinity Mountains, Nevada; 5,000 feet altitude; May. Plate XIV. Fig. 4. A plant; natural size. Fig. 5. Capsule; enlarged two diameters. Fig. 6. Seed. Fig. 7. Its cross-section; both enlarged six diameters. (424.)

Œnothera andina, Nutt. Annual, low, canescently puberulent, branching at base; stems ascending, leaves linear-spatulate, attenuate into slender petioles, entire, obtuse; flowers minute, axillary, yellow, very numerous; calyx-tube funnelform, rather shorter than the segments, many times shorter

than the subulate ovary; petals ½–1″ long, obovate, entire, scarcely exceeding the longer stamens and style, deciduous with the stamens from the calyx; capsules sessile upon the petiole, somewhat 4-angled, nearly straight, attenuate-subulate above; seeds oblong-cylindrical, on a filiform placenta.—Stems 1–4′ high, often becoming densely crowded with the obconical capsules, which are 4–6″ long. Discovered by Nuttall in Southern Idaho. Not rare in Nevada from the Havallah Range to the East Humboldt Mountains, and found in Heber Valley in the Wahsatch; 6–8,000 feet altitude; June–August. (425.)

Gaura parviflora, Dougl. Stem tall, erect, and with the margin of the leaves villous with soft white hairs; leaves ovate-lanceolate, acute or acuminate, repand-denticulate, clothed on both sides with a short velvety pubescence; spike virgate, strict, many-flowered, elongating in fruit; bracts lanceolate-subulate; flowers very small, the calyx-tube shorter than the glabrous ovary and exceeding the segments; anthers oval, retuse, attached by the middle; stigmas not at all or scarcely produced beyond the indusium; fruit oblong, sessile, obtusely angled above, 4-nerved.—Stems 2–5° high, with small rose-colored flowers, and leaves 1–3′ in length; capsules 3–4″ long, obtuse at maturity. From Louisiana to Arizona and northward to the Platte and the Columbia; rather rare. Humboldt Pass, Nevada; Stansbury Island, Salt Lake; June, September. (426.)

Circæa alpina, L., Var. intermedia, Ehrh. *DC. Prodr.* 3. 63. Stems erect, 3–10′ high; leaves slightly repand-denticulate, cordate, acuminate; bracts almost none; fruit 1-celled.—It is nearest to *C. alpina*, but is the *C. Lutetiana*, Var. *occidentalis*, of Nuttall, in Herb. Gray. Also collected by Lyall in the Galton Mountains, and by Bolander in California. The species extends from the Northern States and Canada to the Saskatchewan, Oregon and Sitka. Found in the Wahsatch Mountains, Utah; 7–8,000 feet altitude; July, August. (427.)

## LOASACEÆ.

Mentzelia albicaulis, Dougl. Stem 6–18′ high, branching from the base, white and polished and nearly glabrous below, rather weak; leaves lanceolate, remote, more or less deeply sinuate-pinnatifid or toothed, sessile; flowers solitary or somewhat clustered, bracteolate; petals obovate, 2″ long, light yellow, scarcely exceeding the short subulate-lanceolate calyx-segments;

filaments 15–30, subulate-filiform or occasionally somewhat dilated; capsules cylindric, narrow, elongated; seeds 20–40.—From Sonora and New Mexico to California, Utah and Colorado. Frequent in Nevada from the Washoe to the East Humboldt Mountains, and also found on Carrington Island, Salt Lake; 4,200–8,000 feet altitude; May–July. (428.)

Var. GRACILENTA. (*M. gracilenta*, T. & G.) Flowers usually somewhat capitate, 2–3 times larger, petals 2–4″ long, deep yellow with an orange base; stems simple or branched, erect and strict; leaves very variable, often linear-pinnatifid with numerous segments, or oblong- or ovate-lanceolate and more or less entire.—California and Southern Oregon, (Cronkhite.) It is 506 and 575 Brewer, 165 Coulter, and *M. Veatchiana*, Kell. Frequent from the Washoe to the West Humboldt Mountains, Nevada; 5,000 feet altitude; May–July. (429.)

Var. INTEGRIFOLIA. Usually branched; leaves ovate, oblong or oblong-lanceolate, entire or sinuately toothed or pinnatifid; flowers and fruit as in the ordinary *M. albicaulis*, but the seeds rather few (6–20) and some of the 15–20 filaments occasionally petaloid.—There seems very little to separate this from *M. micrantha*, H. & A., which has the same habit and foliage and is by no means constant in having a 3-seeded capsule, having sometimes half-a-dozen or more seeds. This is 663 Geyer, 571 Hall & Harbour, and 195 Vasey. East Humboldt Mountains, Nevada, and Antelope Island and the Wahsatch, Utah; 4,500–6,000 feet altitude; June, July. (430.)

MENTZELIA CONGESTA, Nutt. Stem 6–10′ high, branching, pubescent, white; leaves short, the lower linear-lanceolate, entire or pinnatifid, the upper ones clasping; bracts membranous, toothed, broadly ovate and embracing the sessile clusters of (3–5) flowers; petals 2″ in length, yellow, orange at base, a little longer than the calyx; stamens about 20; capsules clavate-oblong, 12–20-seeded.—Rare; collected only by Nuttall in Southern Idaho. Found on the foot-hills of the Toyabe Mountains, east of Austin, Nevada; 6,000 feet altitude; July. (431.)

MENTZELIA LÆVICAULIS, T. & G. Tall, 2–3° high, stout, branching; leaves lanceolate, sinuate-pinnatifid, sessile; flowers large and showy, terminating the branches and often somewhat crowded; bracteoles none, or few and subulate; petals 5 or rarely 10, 2′ long, yellow, erect-spreading, lanceolate, acute, longer than the lanceolate acuminate sepals; stamens very many, the 5 outer filaments dilated; seeds numerous, winged.—Mature capsule 1′–1½′

long and 6″ in diameter; petals a light sulphur-yellow, fading with age, open during the day. *M. ornata*, with "white" flowers and bracteated calyx-tube, was not met with. Stansbury's plant, so named, is *lævicaulis*. From New Mexico and Colorado to California and Washington Territory. On dry foot-hills from the Washoe Mountains to Salt Lake; 4,500–6,000 feet altitude; June–September. (432.)

## CACTACEÆ.

BY DR. GEORGE ENGELMANN.

MAMILLARIA[1] (EUMAMILLARIA) GRAHAMI, Eng. Globose or oval, usually simple, 1–3′ high; on the short oval close-set tubercles are numerous thin but rigid whitish spines, 3–6″ long, the outer 15–30 in a single series and straight, surrounding a stouter and longer hooked brown one; flowers small, nearly 1′ wide, reddish; berry oval, green, with black pitted seeds.—Rocky localities in Southern New Mexico, Arizona and the adjoining parts of Utah.

MAMILLARIA PHELLOSPERMA, Eng. Resembling the last, rather larger, more oblong or cylindrical; tubercles longer and less crowded; spines more numerous, the outer 40–60 in two series, the exterior bristle-like, the inner more robust, with 3–4 brown central spines, of which one or more are hooked; flowers similar; berry club-shaped, scarlet; seed globose, with a larger spongy brown appendage.—Gravelly soil in Southern Utah and Arizona, rarer than the last.

MAMILLARIA (CORYPHANTHA) VIVIPARA, Haw., Var. Simple, oval, the almost terete tubercles bearing fascicles of 5–8 reddish-brown spines surrounded by 15–20 grayish ones in a single series, all straight and very rigid, the latter 5–8″, the former even 10″ long; flowers purple, often 2′ or more in diameter, with numerous lance-subulate petals and fringed sepals; berry oval, green; seed pitted, light-brown.—Near St. George, Southern Utah, (J. E. Johnson.) Larger than the often cæspitose forms of the eastern slopes and

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[1] MAMILLARIA, HAW. Sepals and petals united beyond the naked ovary into a short tube. Berry juicy, oval or club-shaped. Seeds brown or black; embryo straight, without albumen; cotyledons very short, globose.—Low globose or oval plants, simple or branched, covered with spine-bearing tubercles; flowers rising from the axils of the tubercles, usually small, about as wide as long, opening in sunshine only. Comprising two sections:—

§ EUMAMILLARIA, ENG. Flowers from the axils of the older (never grooved) tubercles, usually small.

§ CORYPHANTHA, ENG. Tubercles grooved on the upper surface; flowers usually large, from the axils of the youngest often scarcely developed tubercles.

plains. Another simple form, but scarcely half as large, occurs in Colorado and possibly in Eastern Utah.

MAMILLARIA NUTTALLII, Eng. Smaller, globose, simple or sometimes cæspitose, with fewer (10–20) weaker ash-colored spines; flowers yellow, 1–2′ broad; berries scarlet, subglobose; seeds few, black, globose, pitted.—Common on the eastern slopes of the mountains of Colorado and perhaps to be found in Eastern Utah.

ECHINOCACTUS[1] SIMPSONI, Eng. Simple, globose or depressed, with ovate tubercles like a *Mamillaria*, bearing about 20 outer ash-colored spines and 5–10 stouter darker inner ones, all straight and rigid; flowers from the top of the just developing tubercles, small, 9–12″ broad, yellowish-green to purplish; scales on the ovary very few; berry small, dry, with few black tuberculated seeds.—Butte and Kobe Valleys, Utah, (H. Engelmann;) frequent on the eastern slopes of the Rocky Mountains, Colorado; flowering in April and May. [Found on the Havallah, Battle and Toyabe Mountains, and above Thousand Spring Valley, Nevada, only on high rocky ridges; 7–8,000 feet altitude; July, in flower. Heads 2–5′ in diameter, often clustered, the fleshy interior frequently colored. S. W.] A small variety, resembling forms of *M. vivipara* in habit, but the tubercles grooveless and fruiting at top, has spines 4–6″ long, the inner scarcely different; a larger form has much larger tubercles and spines, often 12–14″ long, the inner ones bright reddish-brown. (433.)

ECHINOCACTUS WHIPPLEI, Eng. & Big. Middle-sized, globose or oval, with 13 interrupted ribs; outer spines 7–11, mostly ivory-white, the lowest darkish, the upper much longer, flat and often curved; central spines 4, the upper broader, longer, white, the others brown, the lowest hooked; flowers greenish-red, with few (2–5) sepals on the ovary, 9–15″ long, not quite so wide; seeds few, large, tuberculate.—Heads 3–5′ high; spines 3–20″ long. On the lower Colorado, (Bigelow, Newberry;) in Desert Valley, west of Sevier Lake, Utah, (H. Engelmann;) the latter with more radial spines and often with more than one hooked.

ECHINOCACTUS POLYANCISTRUS, Eng. & Big. Medium-sized, oval, with

[1] ECHINOCACTUS, LINK & OTTO. Sepals and petals united beyond the sepal-bearing ovary into a short tube. Berry globose or oval, juicy or dry, covered with scales and sometimes with wool. Seeds brown or black; embryo usually curved over a small albumen; cotyledons short, foliaceous, parallel to the sides of the seed.—Globose or oval, mostly simple, generally many-ribbed with bunches of spines on the ribs, rarely tuberculated; flowers near the top, just above and close to the spines of the same season, usually large, as wide as long, open only in sunshine.

13–17 interrupted ribs; outer spines 20 or more, white, the uppermost broader and longer; central spines 5–10, upper one broadest, longest, white, curved, the others brown, terete, mostly hooked; flowers yellow, large, 2–2½′ long and wide, with about 8 fringed sepals on the ovary; seeds as in the last.—Head-waters of the Mohave (Bigelow) to the sage-plains of Western Nevada, (Gabb;) the southern form 4–10′ high, with longer spines, (the longest 3–5′;) the northern but 3–4′ high, with spines rarely more than 2′, the radial ones but ¼–1′ long.

ECHINOCACTUS PUBISPINUS, Eng. Small, (only 2′ high,) oval, with 13 compressed sinuate ribs; outer spines 6–10, bristle-like, 1–4″ long, the uppermost longest, often curved or hooked, with or without a stouter hooked central one, all usually densely pubescent.—Flower and fruit unknown. Found by H. Engelmann in Pleasant Valley near Salt Lake Desert.

ECHINOCACTUS JOHNSONI, Parry MSS. Medium-sized, (4–6′ high,) oval, with 17–21 low rounded interrupted close-set often oblique ribs, densely covered with stoutish reddish-gray spines; the outer 10–14, ½–1¼′ long, the upper longest; the central 4, stouter, recurved, 1½′ long; flowers large, 2–2¼′ long and wide, purple or pink, with numerous reniform sepals on the ovary and tube, and ovate obtuse petals; seeds reticulate-pitted.—Discovered about St. George in Southern Utah by J. E. Johnson, whose zeal for the development of the natural history and resources of his region is commemorated in the name of the species.

ECHINOCACTUS POLYCEPHALUS, Eng. and Big. Usually with several heads, often over a foot high, with few very stout annulated curved spines and very early flowers, the base of which, as well as the fruit, is enveloped in dense cotton.—From the Mohave region, and may be looked for in Southern Nevada.

CEREUS[1] ENGELMANNI, Parry. Heads several, 4–12′ high, cylindric or ovate, with 11–13 ribs, bearing bunches of about 13 pale acicular radiating

[1] CEREUS, HAW. Sepals and petals united above the sepal-bearing ovary into a short or usually long tube. Berry juicy, globose or oval, beset with scales (sometimes rather indistinct) or spines. Seeds brown or black; embryo straight or usually curved, without albumen; cotyledons short or foliaceous, commonly contrary to the sides of the seed.—Globose or oval, or mostly cylindric or columnar, few- or many-ribbed, usually branched, bearing bunches of spines on the ribs; flowers lateral, just above and close to the spines of previous seasons, usually large, fully open in sunlight or at night or, rarely, permanently.

The above species belong to § ECHINOCEREUS, Eng.:—Heads commonly many, low, oval or cylindric; flowers short, mostly as wide as long; ovary covered with bunches of spines; stigmas green; seeds small, tuberculated; cotyledons short, straight.

spines, 3–6″ long, and about 4 darker (yellow, brown or black) stout and angular, straight or curved, central ones, 1–3′ long; flowers very numerous, large, ($2\frac{1}{2}'$ broad or more,) purple, diurnal.—From Salt Lake Desert (H. Engelmann) to Silver Peak in the Sierras, (Gabb,) and southward to Southern Utah (Johnson) and the Mohave country (Bigelow.)

CEREUS VIRIDIFLORUS, Eng. With very short pectinate pale and reddish-brown spines and small green flowers.—Common in Colorado, and may be found in Utah.

OPUNTIA[1] (PLATOPUNTIA) BASILARIS, Eng. & Big. Low; joints 5–8′ long, obovate or triangular, proliferous from their base, pubescent, unarmed, but beset with numerous dense fascicles of short brownish bristles, as is also the ovary; flowers large, $2\frac{1}{2}'$ in diameter, purple; fruit dry, with large and thick seeds.—Nevada, in the Silver Peak region south of Walker's Lake, (Gabb,) and southward.

OPUNTIA SPHÆROCARPA, Eng. & Big., Var. (?) UTAHENSIS, Eng. Prostrate; joints small, orbicular-ovate, 2–3′ long and nearly as wide, thick; spines in the axils of the minute subulate leaves, few and mostly weak or solitary or none, with few and very short bristles; flowers 3′ in diameter, pale-yellow; fruit oval, almost spineless, at last dry.—In the pass west of Steptoe Valley, Utah, (H. Engelmann.)

OPUNTIA MISSOURIENSIS, DC. Prostrate; joints medium-sized, obovate or almost orbicular, tuberculate; leaves minute, subulate, all bearing in their axils 5–10 radiating or deflexed spines, 1–2′ long, often with a few erect darker ones; flower large, 3′ broad, yellow; ovary and dry fruit spiny.—Quite variable, especially in the stoutness and color of the spines. From the Upper Missouri to the Canadian and New Mexico, and throughout the Salt Lake Basin. [Found in Salt Lake Valley and the Wahsatch; 4,200–6,500 feet altitude; July, in flower. Joints sometimes 6′ long and 4′ broad. W.] (434.)

Var. [With smaller creeping joints, the numerous fascicles of short stout spines strongly reflexed. Above Wahsatch Station in the Wahsatch Mountains; 7,000 feet altitude. W.] (435.)

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[1] OPUNTIA, TOURN. Sepals and petals united beyond the sepal-bearing ovary into a very short cup. Berry pulpy or dry. Seeds large, whitish, bony, flat, mostly irregular. Embryo curved around the albumen; cotyledons foliaceous, usually contrary to the sides of the seed.—Jointed, the joints broad and flat, or clavate or cylindrical, bearing bunches of barbed spines and bristles in the axils of small terete deciduous leaves, and from their middle rather large flowers, opening only in sunshine and much wider than long. The above species belong to the two sections:—

§ PLATOPUNTIA, Eng. Joints flattened; embryo somewhat spiral.

§ CYLINDROPUNTIA, Eng. Joints clavate or cylindrical; embryo nearly circular.

OPUNTIA HYSTRICINA, Eng. & Big. Very similar to the preceding and probably only a form of it, with longer and more numerous gray or reddish spines, longer yellow bristles, and usually smaller flowers.—New Mexico; between Walker and Carson Rivers, (H. Engelmann,) and Owen's Valley, (Gabb,) Nevada. [Found abundantly in Monitor and Thousand Spring Valleys, Nevada; 5–6,000 feet altitude; July, in flower; September, in fruit. Flowers either purple or sulphur-yellow, scarcely smaller. W.] (436.)

OPUNTIA RUTILA, Nutt. Similar to *O. Missouriensis;* joints often larger, 3′ by 4′, covered with closely set bunches of mostly radiating and deflexed spines, the larger ones flattened and often twisted; flowers rose-red; ovary and dry berry spiny.—From Fillmore to St. George, Utah, (Dr. Palmer; J. E. Johnson;) a rediscovery of Nuttall's long-lost plant, who found it near the Green River in Southern Wyoming.

OPUNTIA ERINACEA, Eng. & Big. *Pac. R. R. Surv.* 4. 47, *t.* 13. Diffuse, ascending; joints thick, ovate, 2–2½′ long, or sometimes elongated and almost cylindric, densely covered with clusters of 3–5 radiating spines, slender, ½–1½′ long, very rigid, reddish-gray, with 2–4 smaller ones below; berry ovate, 1¼′ long, with crowded clusters of 12–20 mostly deflexed spines, 3–6″ long.—Near Mohave Creek, Southern California, (Bigelow.) [A specimen in Herb. Gray., collected by Dr. Bloomer near Virginia City, Nevada, (not seen by Dr. Engelmann,) may belong to this species. W.]

OPUNTIA FRAGILIS, Nutt. Joints small, ovate, compressed or tumid or even terete, 1–1½′ long, fragile; larger spines 4, cruciate, mostly yellowish brown, with 4–6 smaller white radiating ones below; bristles few; flowers smaller, yellow; fruit smaller, with 20–28 clusters of bristles, only the upper ones with a few short spines; seeds few, regular.—On the Upper Missouri and Yellowstone, southward probably to New Mexico. [Found at the west base of the Wahsatch in Jordan Valley. Specimens not seen by Dr. Engelmann, but doubtless of this species. W.] (437.)

OPUNTIA (CYLINDROPUNTIA) PULCHELLA, Eng. Low, 3–10′ high, spreading; joints small, slender, 1–3′ long, 6″ thick, clavate, tuberculated, with bunches of straight radiating spines 6–18″ long, from white to nearly black, one or more of the inner longer ones flattened; flowers purple, 1½′ or less in diameter; ovary and dry berry bearing numerous flexible not barbed bristles.—Near Walker's River, Nevada, (H. Engelmann, Gabb.) [Frequent in the valleys of Western Nevada from the Trinity Mountains to Monitor Valley;

4–5,000 feet altitude; May–August. A very showy species, with sometimes 50 flowers upon a single plant; main stem erect, becoming 9″ in thickness and occasionally showing 25 annual rings. W.] (438.)

OPUNTIA ARBORESCENS, Eng. 3–5° high or more, with horizontal branches, cylindric strongly tuberculated joints, numerous sheathed spines, large purple flowers, and tuberculated unarmed fruit.—New Mexico and Arizona, and probably farther northward.

OPUNTIA ACANTHOCARPA, Eng. & Big. Similar to the last; rather more slender and with more erect branches, smaller copper-colored flowers and rather even spiny, fruit.—Arizona, and probably Southern Utah.

OPUNTIA FRUTESCENS, Eng. 2–4° high, with slender terete joints 3″ in thickness, very small yellow flowers and scarlet berries.—From Texas to Southeastern California, and probably farther northward.

## FICOIDEÆ.

SESUVIUM PORTULACASTRUM, L., Var. Leaves spatulate-obovate and obtuse, as in *S. pentandrum.* Florida to New Jersey. Growing in alkaline soil, Truckee Meadows and at the Hot Springs near Meigs's Station, Nevada; 4,500 feet altitude; May–July. (439.)

## UMBELLIFERÆ.

OROGENIA[1] LINEARIFOLIA. Stem leafless, rising but an inch or two above the ground and very slender; leaves 2–3, upon filiform petioles, equaling the stem; leaflets 1–2′ long and 1″ wide, petiolulate, obtuse; umbels with 2–3 rays, 1–4′ long; umbellets 3–5-flowered; flowers nearly sessile; involucre none; involucels of a few (1–3) linear leaflets exceeding the rays; fruit 1½–2″ long, oblong, subcompressed; tubers small, rounded, 3–5″ in diameter.—Damp shaded ridge of the Wahsatch, north of Parley's Park; 7,500 feet altitude; June 28, in fruit. Near to *Erigenia*, both in habit and characters. PLATE XIV. Fig. 1. Plant; natural size. Fig. 2. Carpel; enlarged four diameters. Fig. 3. Cross-section of same; enlarged eight diameters. (440.)

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[1] OROGENIA. Calyx-teeth minute. Stylopodia somewhat elevated. Fruit ovoid, but slightly compressed laterally and with a commissure but little narrowed; carpels dorsally compressed, slightly incurved; the 3 dorsal ribs filiform, the lateral thickened, corky and involute; vittæ obscure, 3 in each interval, and 2–4 in the commissure. Carpophore (?) adnate to the carpels and forming a thick corky midrib dividing the hollowed face of the commissure longitudinally. Seed somewhat concave.—Dwarf, scarcely caulescent, glabrous. Root tuberous. Leaves radical, 1–2-ternate; segments entire, linear. Umbel subcompound, with few very short unequal rays.

Cicuta maculata, L. From Florida to Mississippi and northward to Canada and the Saskatchewan; collected rather rarely west of the Mississippi, but reported from the Lower Platte, (Frémont,) Western Texas, New Mexico and Southern California. Truckee, Diamond, and Thousand Spring Valleys, Nevada; 4–6,000 feet altitude; July–September. (441.)

Carum[1] Gairdneri, Benth. & Hook. (*Edosmia*, T. & G.) Root tuberous; stems terete, slender, 1–4° high, with a few 1–3-pinnate or ternate leaves and linear or sometimes lanceolate leaflets, the upper leaves sheathing and often simple; umbels on elongated peduncles, with 6–12 rays; calyx-teeth small, ovate, persistent; petals white, broadly obcordate; fruit about 1″ long, ovate, glabrous, contracted at the commissure, with solitary broad thin vittæ; involucre of 1–2, and involucels of several setaceous bracts.—Tubers 2–3 in a fascicle, scarcely the size of the little finger, but forming an important article of food to the Indian tribes. The common name for it through Utah and Nevada is "Yep," "Yepah," or "Yampah." It is very nutritious, contains much starch, and its taste is sweet and pleasant. From Washington Territory and Idaho to California and Utah. Frequent through Nevada and in the Wahsatch; 5–6,500 feet altitude; June–October. (442.)

Sium lineare, Mx. With leaves varying from nearly entire to incisely pinnatifid. From Florida to Mississippi and northward to Canada and the Saskatchewan; collected also in Kansas, Colorado, and Oregon. Found in the Truckee and Ruby Valleys, Nevada, and in Weber Valley, Utah; 4–6,000 feet altitude; July–August. (443.)

Sium angustifolium, L. Widely but sparingly distributed; Massachusetts to Illinois and Wisconsin, Wyoming, Oregon, California, New Mexico, and Florida. Found in Diamond, Ruby and Upper Humboldt Valleys, Nevada, and in Salt Lake Valley; 4,500–6,000 feet altitude; July–October. (444.)

Pimpinella[2] apiodora, Gray. *Proc. Amer. Acad.*, 7. 345. Stems

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[1] CARUM, L. Calyx-teeth small, minute, or none, (conspicuous in *C. Kellogii.*) Petals with the point inflexed and more or less 2-lobed by the intrusion of the midvein. Stylopodia more or less broadly conical. Fruit ovate or oblong, laterally compressed and often narrowed at the commissure, very rarely didymous; carpels 5-angled; ribs obtuse, slightly prominent, equal, the lateral ones marginal; vittæ solitary, very rarely in pairs. Carpophore bifid or 2-parted. Seed subterete, convex upon the face, or flat, or slightly concave.—Annual or perennial, and glabrous, or the fruit only hispid. Leaves pinnate, or ternately or pinnately decompound. Umbels compound. Leaves of the involucre few or none, of the involucels usually several, entire. Benth. & Hook.

[2] PIMPINELLA, L. Calyx-teeth obsolete or rarely small. Petals narrowed to an inflexed point. Stylopodia cushioned, or conical; styles usually elongated. Fruit ovate or shorter than the width, more

slender, 1–3° high; leaves ternately decompound with incisely pinnatifid or trifid leaflets, the segments oblong or subcuneate, incised; cauline leaves usually 1–2, with a short sheathing petiole; leaflets of the involucels linear-subulate or setaceous; petals white or sometimes pinkish; fruit broadly ovate, subdidymous, with slightly prominent ribs.—Coast range of Northern California. Found in the Clover Mountains, Nevada; 9,000 feet altitude; September. (445.)

OSMORHIZA NUDA, Torr. *Pac. R. R. Surv.*, 4. 93. Petioles and lower part of the stem strigosely pubescent; leaflets broadly ovate, often deeply 3-lobed, coarsely dentate-serrate; peduncles elongated; involucre and involucels none; umbel 4-rayed, rays 4–6-flowered; styles very short; fruit obtuse, shorter than the pedicels.—In these specimens, however, as in those from California, involucres and involucels are occasionally present, though small; the pedicels are frequently shorter than the fruit; and the stems, peduncles and leaves are often nearly or quite glabrous. On the other hand, *O. brevistylis* of the Eastern States is sometimes seen with its umbels fully as naked. California; Alaska. Frequent in the Wahsatch and Uinta Mountains; 5–9,000 feet altitude; May–August. (446.)

MYRRHIS[1] OCCIDENTALIS, Benth. & Hook. (*Glycosma*, Nutt.) Somewhat puberulent or pubescent; stems 2–4° high, branching; leaves long-petioled, the cauline sessile, biternate or bipinnate, segment oblong or ovate-lanceolate, incisely serrate; umbels of 8–12 slender rays; fruit dark-green or black, 6–8″ long, glabrous, with very short styles, the ribs acute but marginless.—California and Oregon. Found in the Havallah range and East and West Humboldt Mountains, Nevada, and in the Wahsatch; 6–7,000 feet altitude; June–August. Some of the specimens might perhaps be referred

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or less laterally compressed, often constricted at the broad commissure; carpels subterete or dorsally compressed, with the 5-ribs equal, often slender, distant; vittæ numerous, conspicuous or very delicate, rarely approximate under the ribs or subsolitary. Carpophore bifid or 2-parted. Seeds subterete or dorsally compressed, nearly flat on the face, often free from the loose pericarp.—Usually perennial and glabrous, or the flowers and fruit a little hairy, with mostly ternately or pinnately decompound leaves and compound umbels. Involucre and involucels usually none or of a few small leaflets. BENTH. & HOOK.

[1] MYRRHIS, Scop. Calyx-teeth minute or obsolete. Petals cuneate-obovate or oblong, inflexed and quasi-emarginate or 2-lobed. Stylopodia thick, cushioned or short-conical, subentire. Fruit elongated, shortly beaked, somewhat compressed laterally, with a broad commissure; carpels very convex on the back; ribs equal, rather thick, elevated or margined, smooth or roughened; vittæ solitary in the intervals, very minute. Carpophore bifid. Seeds subcompressed dorsally, slightly concave or deeply sulcate on the face.—Perennial, pubescent or villous, with biternate or pinnately decompound leaves and dentate leaflets; umbels compound, without involucre and involucels (in American species;) flowers white. BENTH. & HOOK.

to *M. Bolanderi*, Gray, but there is so much variation in pubescence, in the size and section of the leaflets, and in the length of the fruiting pedicels that there seems hardly place for distinction. An original specimen of Nuttall's in Herb. Torr. has the pedicels but 1–1½″ long, and the stems subpubescent. (447.)

CYMOPTERUS[1] NIVALIS. Caudex long and branching; minutely scabrous-puberulent or subglabrous, glaucous; leaves simply pinnate with the leaflets 3–5-lobed or pinnately dissected, the segments oblong-lanceolate, acute or mucronate; scape exceeding the leaves, 2–4′ high, with a single small nearly capitate umbel; involucre none; involucel 1-sided, of 5–7 broad obtuse membranous bracts, united at base, and nearly equaling the white or pinkish flowers; calyx-teeth short and obtuse; wings equal, thin.—Near *C. alpinus*, but distinguished by the involucels, the smaller and more compact umbels of white flowers, and the comparatively thin, less corky wings. East Humboldt Mountains, Nevada; 9–10,000 feet altitude; July, August. (448.)

CYMOPTERUS MONTANUS, Nutt. Stem usually solitary from a fleshy root, erect, sheathed at base, 1–2′ long; leaves glaucous, glabrous or somewhat scabrous-puberulent, bipinnately divided, the segments (about 3–4 pairs) oblong, somewhat incised, obtuse and submucronulate; peduncles usually shorter than the leaves; involucre and involucels somewhat campanulate, scarious, about 5-parted, the segments obovate and obtuse, entire or 3–5-cleft, with greenish ribs; flowers white, polygamous; calyx-teeth small, ovate; fruit about 3″ long; carpophore persistent, 2-parted; wings 6–10, broad and membranous, often unequal; seed more or less involute.—An abnormal form was collected by Beckwith on the Goshoot Mountains, Utah, having 10 spongy wings on the upper part of the ovary extending beyond the flower, the stamens reduced to rudiments, petals 2-3, of an unusual form, the styles conspicuous but without stigmas. The species extends from Western Texas to Arizona and north to Colorado and Montana.

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[1] CYMOPTERUS, RAF. Calyx-teeth rather prominent and setaceous or lanceolate, minute or obsolete. Petals ovate, oblong or oblanceolate, inflexed, quasi-emarginate. Disk flattened around the styles, undulate-margined. Fruit ovate or elliptical, obtuse or retuse, subterete or slightly compressed dorsally; carpels semiterete; ribs thick and elevated, all or only the lateral ones or those opposite to the calyx-teeth expanded into wings; vittæ numerous, narrow. Carpophore 2-parted, free or attached to the carpels. Seeds much compressed dorsally and more or less concave on the face.—Perennial and subcæspitose, with a thickened caudex; leaves pinnately decompound with narrow small or incisely pinnatifid segments; umbels compound, usually few-rayed; involucral bracts 1–2 or none, of the involucels several, very narrow or broad and membranous; flowers white or yellow. BENTH. & HOOK.

Var. GLOBOSUS. Glabrous; flowers in dense globose heads, 4–8″ in diameter, the broad membranous involucrate bracts only sometimes apparent in the fruiting specimens; staminate flowers few and central, or occupying the whole umbel; fruit 5–7″ long, with the wings 2–3″ broad; vittæ 3 in the intervals, and 3–4 on each side of the commissure opposite to the edges of the strongly involute seed.—A well marked variety. Carson Valley and on the Virginia and Trinity Mountains, Nevada; 4,500–7,000 feet altitude; April, May. As in several other species of the genus, the root has an agreeable flavor and is gathered for food by the Indians in early spring. (449.)

CYMOPTERUS GLAUCUS, Nutt. Caudex and leaves as in the last, but the segments more numerous (5–7 pairs) and pinnately incised, with linear-oblong divisions, more or less scabrous-puberulent; peduncles elongating in fruit and exceeding the leaves; rays 10–15, 4–6″ long; involucre none; involucels of 6–8 linear acute leaflets; flowers white; calyx-teeth small; fruit 2″ long, with 10 narrow somewhat corky wings; carpophore 2-parted; vittæ as in the last, forming slight ridges in the broad intervals; seeds involute.—Nuttall's description was drawn from young specimens, with which these accord exactly; collected by him in northern Idaho. Found on the Battle and East Humboldt Mountains, Nevada; 7–7,500 feet altitude; June, July. (450.)

CYMOPTERUS LONGIPES. As in the preceding, but the stem 4–6′ high, and the fruiting peduncles exceeding the leaves, 4–10′ in length; very nearly glabrous throughout; segments of the leaves 3–5 pairs, somewhat pinnate, the divisions broadly oval and mucronulate; involucre none or a single setaceous leaflet; involucels of 6–8 subulate acuminate somewhat scarious bracts; rays about 10, 4–10″ long; flowers yellow; calyx-teeth small, ovate, obtuse; fruit 3–4″ long; carpophore 2-parted; vittæ broad and conspicuous, 3–4 in the intervals and 3 on each side of the commissure; wings 10, broad and scariously membranous, somewhat unequal; seed very strongly involute, sometimes even terete by the meeting of the opposite edges.—Wahsatch Mountains near Salt Lake City, and on Antelope Island; 5,000 feet altitude; May, June. (451.)

CYMOPTERUS FŒNICULACEUS, Nutt. Glabrous; stems very short, from a branching and spreading caudex; leaves mostly radical on rather long and slender petioles, pinnately decompound, the segments short and linear, acuminate; cauline leaves near the base, resembling the radical ones; peduncles 3–6′ long; umbel of 8–12 unequal rays, without involucre;

involucels of several lanceolate bracts; flowers yellow, with prominent lanceolate calyx-teeth; fruit 3–4″ long, with one carpel often abortive, the perfect one with 3–5 rather narrow undulate membranous wings (the middle or intermediate ones often wanting;) vittæ numerous, 3–4 in the intervals and 6–10 upon the commissure; carpophore free, 2-parted; seed concave.—Allied to *C. terebinthinus*, which is a stouter plant with rigid coarsely dissected leaves; Eastern Oregon, (Nuttall;) Sierras of California, (Brewer.) Found in the Virginia and West Humboldt Mountains, Nevada; 6–9,000 feet altitude; May–September. (452.)

CYMOPTERUS (?) ANISATUS, Gray. *Proc. Acad. Phil., Mar.* 1863, *p.* 63. Acaulescent, cæspitose from a much-branched caudex, glabrous; leaves 4–6′ long, narrow, on long petioles, somewhat rigid, pinnate, the leaflets 6–10 pairs, pinnately parted; segments entire or laciniately lobed, linear, pungently acute; scapes equaling or exceeding the leaves, 6–12′ high; rays 8–12, unequal; involucre usually none; involucels of 6–8 linear-subulate leaflets, equaling the white flowers; calyx-teeth conspicuous, linear-subulate, foliaceous; fruit 2″ long, irregularly winged, the lateral ribs and one dorsal one usually broader, rather thick and not membranous; vittæ obscure, one in each narrow interval, 2–4 on the commissure; seeds slightly concave, somewhat crenately sulcate under the dorsal intervals.—This is 157 Parry (1861) and 222 Hall & Harbour from Colorado, its determination still left doubtful. The nearly mature fruit now collected would rather place it in the genus *Seseli* but for the too prominent wings. Found in the East Humboldt Mountains, Nevada, and in the Wahsatch; 8–9,000 feet altitude; July, August. (453.)

LIGUSTICUM APIIFOLIUM, Benth. & Hook. (*Cynapium*, Nutt.) Stems 2–4° high, terete, leafy or naked, branching towards the summit, with 2–4 umbels on long peduncles; leaves pinnately decompound, the segments incisely lobed, acute; cauline leaves ternate, upon a short dilated sheath; involucre none; involucel few-leaved, lateral; calyx-teeth obsolete; the stylopodia rather prominent, with a somewhat dilated crenate margin; fruit 2½″ long, oval, with acutely carinate ribs; seeds concave on the face, with a central longitudinal ridge.—Oregon, California, and Colorado; probably throughout the Rocky Mountain region. In the Wahsatch and Uinta Mountains; 8–9,000 feet altitude; with immature fruit, July and August. (454.)

THASPIUM TRIFOLIATUM, Gray. From Florida to Louisiana and northward

to Canada and the Saskatchewan; Western Wyoming, (Tolmie.) Wahsatch Mountains, (Parley's Park,) Utah; 6,000 feet altitude; June. (455.)

SELINUM[1] KINGII. Stems 1–2° high, somewhat branching from a thick root; radical leaves bipinnate, the cauline nearly simply pinnate, with petioles dilated at base; leaflets 1–3′ long, ovate or linear-lanceolate, coarsely and unequally serrate, teeth cuspidate; umbels 5–10-rayed, glabrous; involucre and involucels none; calyx-teeth small; petals white; fruit hispid, 2–3″ long, exceeding the raylets, broadly ovate, the dorsal ribs narrowly winged, approximate, the lateral ones broader, slightly thickened; dorsal vittæ solitary, sunk in depressions of the seed, 2–4 on the commissure, which is thickened into a corky ridge in the centre.—A coarse aquatic, found in the East and West Humboldt Mountains, and in Ruby Valley, Nevada; 6,000 feet altitude; August, September. (456.)

SELINUM CAPITELLATUM, Benth. & Hook. (*Sphenosciadium*, Gray. *Proc. Amer. Acad.*, 6. 536.) Much resembling the last; stem stouter, 2–5° high; umbels tomentose; the pubescent flowers and fruit sessile in globose heads; carpels obovate-cuneate or obscurely obcordate, the narrow base strongly 5-ribbed, the ribs expanding upward into thickish wings, the lateral ones broader.—Collected by Dr. Anderson in the Washoe Mountains, near Carson City, Nevada.

ANGELICA BREWERI, Gray. *Proc. Amer. Acad.*, 7. 348. Stout, 3–5° high, glabrous or slightly puberulent; petioles spathaceously dilated; leaves 3-ternate or 3-quinate; leaflets broad-lanceolate, sharply toothed, teeth cuspidate, veinlets reticulated, lateral leaflets sessile, unequal at base and often united; involucre and involucels none; flowers white; fruit 3–4½″ long, puberulent or glabrous, oblong with thick narrow wings; the vittæ large, those upon the back adherent to grooves in the seed, in the lateral intervals sometimes in pairs; seed concave on the face.—On the Sierras of Middle California. Found in the Pah-Ute and East and West Humboldt Mountains, Nevada; 5–8,000 feet altitude; August, October. (457.)

ANGELICA PINNATA. Glabrous throughout, or the immature fruit slightly

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[1] SELINUM, L. Calyx-teeth obsolete or rarely slightly prominent. Petals cuneate or broad, with a long infolded apex, quasi-emarginate or 2-lobed. Stylopodia conical or depressed. Fruit ovoid or rarely ovate-oblong, transversly subterete, slightly compressed dorsally, with a broad commissure; carpels semiterete, the primary ribs very prominent, more or less winged, the lateral ones usually broader; vittæ solitary in the intervals, or very rarely with a second one. Carpophore 2-parted.—Perennial, branching, glabrous; leaves pinnately decompound; involucral bracts none or few and deciduous, of the involucels several, small; flowers white or rarely greenish-yellow. BENTH. & HOOK.

puberulent; stem rather slender, 2–3° high, substriate; petioles spathaceously dilated; leaves simply pinnate, with a tendency to be bipinnate in the lower pair of leaflets, which are often short-petiolulate; leaflets 1–6′ long, 2–4 pairs, ovate to narrowly lanceolate, sharply and somewhat unequally serrate, occasionally entire, veinlets finely reticulated; rays 10–15; umbellets crowded; involucre and involucels none; flowers small, greenish-yellow or dull-purple; calyx-teeth obsolete; stylopodia with a somewhat expanded crenate margin; fruit nearly orbicular, 2–3″ long, emarginate above and below; the dorsal wings thick and rather narrow, the lateral expanded and broader than the seed; vittæ rather large; seed scarcely concave, not sulcate.—Wahsatch and Uinta Mountains; 7–8,000 feet altitude; July, August. Specimens collected by Lyall in the Galton and Cascade Mountains are apparently the same, but are only in flower, and the larger leaves are bipinnately divided. (458.)

ARCHANGELICA GMELINI, DC. (?.) The specimens are without mature fruit; leaflets broadly ovate, ¾–1½′ long, coarsely and unequally dentate, the teeth-cuspidate; involucels wanting or of a few very narrow setaceous bracts; stems 1-2° high. Found in the Uinta Mountains; 10–11,000 feet altitude; August. The species occurs in Massachusetts, in the Rocky Mountains of Colorado, and on the western coast from Behring Strait to Oregon. *A. officinalis*, to which it is referred by Dr. Hooker, is found in Greenland, Labrador and northern Alaska. (459.)

FERULA[1] MULTIFIDA, Gray. (*Leptotænia*, Nutt.) Stems 18′–2° high, stout, several from a large conical root, simple or branched, naked or with 1–2 leaves which are broadly dilated and sheathing at base; segments of the 3–4-pinnate leaves incisely pinnatifid, with narrow or linear lobes; involucre deciduous or of 1–2 persistent leaflets; involucels of several narrow bracts; umbels of 12–15 rays, 2–3′ long; flowers dull-yellow or brownish; fruit 4–9″ long and 4″ broad, about equaling the pedicel.—Much resembling

[1] FERULA, L. Calyx-teeth obsolete or small. Petals broad, with the inflexed point usually short and subentire and with the midrib slightly if at all impressed. Stylopodia small or conical, with a more or less dilated undulate margin. Fruit orbicular or ovate, flattened; carpels scarcely convex on the back; the primary dorsal ribs filiform or slightly elevated, the lateral thin, often with a nerved margin, closely contiguous and forming a wing which is entire before the dehiscence of the fruit; vittæ usually numerous, conspicuous or obscure, very rarely in exceptional carpels but 1–2 in the central intervals. Carpophore free, 2-parted. Seed flattened dorsally.—Perennial, glabrous and often glaucous; leaves pinnately decompound, the ultimate segments usually filiform or small; umbels compound; involucre and involucels of short entire bracts, rarely very small or none: flowers yellow; fruit glabrous. BENTH. & HOOK.

*F. dissecta*, which is a somewhat taller plant, with subsessile fruit and a more persistent several-leaved involucre. The root is very tough and rank and is not eaten by the Pah-Utes. Oregon and Idaho. Abundant from the Washoe Mountains to the Wahsatch; 5–7,000 feet altitude; May–August. (460.)

PEUCEDANUM[1] SATIVUM, Benth. & Hook, (*Pastinaca*, L.) Ruby Valley, Nevada; introduced. (461.)

PEUCEDANUM NUTTALLII. (*P. latifolium*, Nutt.) Acaulescent, from a thick cylindrical root, glabrous; leaves ternate or bi-ternate, the segments ovate or orbicular, 1–1½′ in length, obtuse, with a few cuspidate teeth at the apex; scape 4–12′ long, stout, bearing a single umbel of 15–25 unequal rays, elongating in fruit (3–6′ long;) involucre and involucels none; flower light-yellow; calyx-teeth obsolete; fruit elliptic-oblong, 4″ long, with a narrow thin wing; carpels convex upon the back; ribs but slightly prominent; vittæ very obscure, 3–4 in the intervals and about 4 upon the commissure.—A very well marked and distinct species, with a strong anise-like odor. Collected in Idaho by Nuttall and on the Dalles, Oregon, by Major Raines. Havallah Range, Nevada; 6–8,000 feet altitude; June. An older *P. latifolium*, DC., compels a change of name. (462.)

PEUCEDANUM GRAVEOLENS. Acaulescent, from a thick root, glabrous throughout; leaves bipinnate, the segments linear, elongated, cuspidate; scape 6–18′ high, a little exceeding the leaves; umbels of 6-20 somewhat equal rays; involucre none; involucel unilateral, of 6–8 linear-lanceolate leaflets; flowers yellow; calyx-teeth small but manifest; fruit 4–5″ long and 2″ broad, oblong, with a rather narrow somewhat thickened but acute margin and irregularly raised or but slightly prominent ribs; vittæ about 2 in each interval and 4 on the commissure; seed somewhat sulcate upon the back.—Evidently nearly allied to *P. triternatum*, from which it is distinguished by its entire want of pubescence, the evident though small calyx, the broader variously winged fruit and the more equally rayed umbel. 220 Geyer is the same. Subalpine, abundant in localities and possessing a strong disagreeable odor. Wahsatch and Uinta Mountains; 9–10,000 feet altitude; July, August. (463.)

[1] PEUCEDANUM, L. Very nearly as in *Ferula;* the petals usually more inflexed, with the point more depressed and 2-toothed at the apex; the wing of the fruit narrower, thicker and with a sharper margin, or dilated and thin but with the margin nearly nerveless, and especially differing in the vittæ being almost always solitary in the intervals; the flowers are also often white.—These are the distinctions drawn by Bentham & Hooker. It will be noticed that in several of the present species characters occur which render their position doubtful. A careful revision of the genus, as of the genera of the order, with especial reference to American species, is greatly needed.

Var. ALPINUM. Dwarf; leaves 3′ long, with dilated scarious bases, mostly simply pinnate with 3-5 pairs of leaflets; stems 4–6′ high, with a 3–6-rayed umbel, occasionally subtended by a single involucral bract; fruit 2–3″ long, the margins rather thin and the dorsal ribs either filiform or nearly as prominent as in an *Angelica;* vittæ very obscure, 1–2 in the intervals, 4–6 on the commissure.—East Humboldt Mountains, Nevada; 9,000 feet altitude. (464.)

PEUCEDANUM SIMPLEX, Nutt. MSS., (in Herb. Gray.) Acaulescent, puberulent and glaucous; leaves sheathing at base, pinnate or occasionally bipinnate, the leaflets about 2 pairs, linear or linear-lanceolate, elongated (2–4′ long;) scapes 6–18′ high, slender, exceeding the leaves, with very rarely a petioled leaf in the middle, bearing a single 5–15-rayed umbel; bracts of the involucel usually numerous, lanceolate or setaceous; flowers yellow; calyx-teeth obsolete; fruit large, 3–6″ long and 2–5″ broad, somewhat emarginate at each extremity, the thin submembranous wing nearly as wide as the seed and with a vein-like margin; the dorsal ribs slightly prominent; vittæ broad and solitary; the seed thin and much flattened.—Identical with Nuttall's original specimens; collected by him in the Rocky Mountains, also by Sitgreave in Northwestern Arizona, (*P. triternatum*, var. *platycarpum*, Torr.,) and found more recently in Montana. Rather frequent on the foothills of the Wahsatch; 5–6,000 feet altitude; May–July. (465.)

PEUCEDANUM MILLEFOLIUM. Acaulescent, glabrous; leaves ternate-pinnately decompound, the ultimate segments linear, cuspidate, very numerous; scapes 12–18′ high, with a single umbel of 6–12 fertile nearly equal rays, 1–3′ long, the wholly sterile rays numerous and shorter; involucre none; involucel of 8–12 linear-subulate bracts, not unilateral; calyx-teeth small; petals (apparently white) with a narrowly attenuated point; fruit large, 4–6″ long and 3–4″ broad, about equaling the raylets, somewhat cordate at base, the thin submembranous wing more than half as broad as the seed, the dorsal ribs slightly prominent; vittæ conspicuous and solitary, a central pair in the commissure with a more or less prominent mid-rib between; seed thin, somewhat concave.—Resembling *P. fœniculaceum*, but taller, glabrous, the fruit 2–3 times larger, with fewer vittæ. Antelope Island, Salt Lake; in fruit, June. (466.)

PEUCEDANUM BICOLOR. Caulescent or scarcely so, glabrous or slightly

puberulent; stems ascending or erect, 4–18′ long; petioles wholly dilated and sheathing; leaves ternate-pinnately decompound, the ultimate segments very numerous, linear, somewhat obtuse; cauline leaves few, (1–2,) near the base; umbels terminal, with 5–10 very unequal rays, 1–5′ long; involucre none; involucels unilateral, of 1–8 linear-subulate bracts; calyx-teeth obsolete; petals yellow or white, with a comparatively short and obtuse point; fruit oblong, 4–6″ long, 1–2½″ broad, narrowing upward, several times longer than the pedicels, with a narrow and rather thick lateral margin, the dorsal ribs filiform; vittæ very obscure; seed thin and flattened.—Sometimes an interrupted or anastomosing line may be detected in the intervals and similar marginal ones on the commissure. Resembling *P. caruifolium*, but with different involucels and much narrower fruit. Wahsatch Mountains, Utah; 5–6,500 feet altitude; May, June. (467.)

PEUCEDANUM MACROCARPUM, Nutt. Pubescent; stems short, (6–10′,) several from a long caudex, which terminates below in a fusiform tuber; leaves mostly cauline but near the base, with dilated petioles, bipinnate, the segments pinnately incised, ultimate divisions acute, ovate or shortly linear; umbels 12-18-rayed; involucre none; involucels unilateral, of about 10 linear-lanceolate acuminate segments, equaling the flowers; petals white, (or yellow;) calyx-teeth small; fruit nearly glabrous, narrowly elliptical, 5–6″ long and 1 ″ broad, the margin more than half the width of the seed; ribs filiform; vittæ solitary, 2–4 on the commissure; seed thin and flattened.—Specimens from a single locality have yellow flowers and glabrous involucels, but are otherwise apparently the same. "Honiboi" of the Pah-Utes. Oregon and California to the Saskatchewan. Trinity and West Humboldt Mountains, Nevada; 5,000 feet altitude; May, June. (468.)

PEUCEDANUM (?) NUDICAULE, Nutt. (?) Caulescent or sometimes scarcely so, minutely pruinose-pubescent, 3–15′ high; leafy only at base; leaves bipinnate or ternate-bipinnate, the segments incisely lobed with usually rather broad and subacute divisions; umbel somewhat capitate in flower, with 8-12 rays; involucre none; involucels unilateral, of 6–10 membranously margined, more or less united bracts; petals white, with attenuated apex and quasi-obcordate; calyx-teeth short; fruit pubescent, broadly oval, 3–4 long and 3 broad, the thickish wing more than half as wide as the seed; vittæ 3 in the intervals, 6 upon the commissure, conspicuous; seed flattened.—This is 212 Hall & Harbour, collected also by Parry in Colorado.

It is apparently not the Var. *ellipticum* of Beckwith's collection in the Sierras of Northern California. As observed by Dr. Gray, the plant does not accord with Nuttall's description, nor in all respects with the characters of the genus; the lateral wings, however, are contiguous until the full maturity of the seed. Very frequent in Western Nevada from the Washoe to the West Humboldt Mountains, and the earliest flowering plant of spring; 4,500–6,000 feet altitude; March–June. (469.)

Peucedanum (?) villosum, Nutt. MSS., (in Herb. Gray.) Caulescent or often nearly acaulescent, from a deep often branching rootstock, pruinose-pubescent; leaves with broadly dilated scarious petioles, 2–3-pinnate and sometimes ternate, the segments laciniately lobed, often minute and crowded; stems 3–10′ high, with one or more subcapitate umbels; the rays elongating in fruit; involucre none; involucels unilateral, of several distinct linear-subulate membranous-margined leaflets; calyx-teeth small; petals yellow, narrower than in the last; fruit similar.—Collected by Nuttall on the plains of the Platte; Nebraska, (Hayden;) New Mexico, (Newberry;) and near Virginia City, (Bloomer.) Resembling *P. dasycarpum* (which includes *P. tomentosum*) in habit, but differing in the involucels, more capitate umbels, less tomentose fruit and especially in its more numerous vittæ. It is *P. fœniculaceum*, *γ.*, T. & G. Western Nevada, from the Washoe to the Battle Mountains; 5–8,000 feet altitude; April–June. (470.)

Heracleum lanatum, Mx. From North Carolina to Kentucky and northward to latitude 58°; Missouri, New Mexico, and on the western coast from Sitka to Monterey. Found in the Goose Creek Mountains, Utah, and frequent in the Wahsatch; 6,000 feet altitude; July–October. (471.)

Coriandrum sativum, L. Ditchbank, Unionville Valley, Nevada; introduced. (472.)

## CORNACEÆ.

Cornus pubescens, Nutt. MSS. (*C. sericea*, *β. ? occidentalis*, T. & G.) Branches suberect, branchlets spreading, more or less reddish, puberulent when young; leaves ovate or elliptical, acute or acuminate, slightly pubescent, as well as the somewhat crowded cymes, obtuse or acute at the base; calyx-teeth minute; petals oblong-lanceolate, rather obtuse; drupes subglobose, white, becoming lead-color.—On stream-banks in mountain cañons; 6–8°

high, not stoloniferous; leaves 1½–4′ long, rather lighter colored beneath; cymes 1½–2′ in diameter; petals white; stigma small, capitate. Somewhat variable in pubescence and more so in the size of the leaves. Without the calyx-teeth, enlarged stigma, and woolly pubescence of *C. sericea*, and nearer to *stolonifera*. Berries oily. Washington Territory to California. Rather frequent through Nevada and Utah; 5–7,000 feet altitude; May–September. (473.)

Garrya[1] elliptica, Lindl. 5–8° high, young branches pubescent; leaves thick, broad-elliptic, 1–2′ long, ½–1′ wide, mucronate, strongly undulate on the margin, glabrous above, tomentose beneath; aments nodding, exceeding the leaves; bracts broad-ovate, 3″ long and wide, silky-pubescent; flowers ternate; pedicels of the male flowers exceeding or equaling the bracts, the middle one often longer, the calyx-lobes oblong, 1½″ long, pilose especially at the coherent summits; ovary very hoary-hispid, the styles long-linear, glabrous, divergent, longer than the bracts.—Oregon; California; New Mexico. Reported by Frémont in Southern Nevada.

## CAPRIFOLIACEÆ.

Linnæa borealis, Gronov. From the Arctic Ocean to Pennsylvania, Michigan, the Saskatchewan and Washington Territory; Rocky Mountains of Colorado, (Hall & Harbour.) Found in the Uinta Mountains, Utah; 8,000 feet altitude; July. (474.)

Symphoricarpus montanus, HBK. *Nov. Gen. & Spec.*, 3. 425, *t.* 296. Leaves orbicular, ovate or ovate-lanceolate; flowers axillary, solitary; bracts much shorter than the ovary; teeth of the cup-shaped calyx obtuse, glabrous or ciliate; corolla funnelform, nearly glabrous within; stamens and style included; fruit globular or oblong, white.—A straggling shrub, 2–3° high; leaves very variable, soft-pubescent and ciliate, or wholly glabrous and often

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[1] Garrya, Dougl. Flowers diœcious, solitary or in threes between the decussately connate bracts of the aments. Sterile flowers:—Calyx 4-parted; segments linear, spreading, valvate, sometimes coherent above. Petals none. Stamens 4, opposite to or alternate with the sepals; filaments free; anthers attached by the base, linear, dehiscence introrse or lateral. Disk and rudimentary ovary none. Fertile flowers:—Calyx-tube ovoid; lobes 2, opposite, very short or obsolete. Disk and rudimentary stamens none. Ovary 1-celled; styles 2, filiform and erect, or short and recurved, stigmatose on the inner side, persistent; ovules 2, on long funiculi, pendent collaterally from the top of the cell. Berry ovoid, 1–2-seeded. Seeds oblong, compressed; testa membranous, transversely rugose; albumen fleshy, abundant; embryo cylindric, minute; cotyledons oblong; radicle terete.—Shrubs; branchlets 4-angled; leaves opposite, entire or denticulate, feather-veined, evergreen, on petioles connate at base; aments slender, axillary, solitary, silky, the staminate nodding; flowers small, not jointed. Benth. & Hook.

glaucous, acute or obtuse, entire or coarsely lobed; ¼–1½′ in length; flowers distant along the leafy branches, or sometimes in a short rather naked terminal spike; corolla 2–4″ long, light-pink. It is 905 Coulter, 285 Fendler, 6339 Bolander, &c., and includes *S. glaucescens*, Hook., *S. rotundifolius*, Gray, and probably *S. microphyllus*, HBK. New Mexico, Colorado and California. Abundant on the mountains from the Washoe to the Uintas; 6–9,000 feet altitude; May–September. (475.)

LONICERA INVOLUCRATA, Banks. From Lake Superior to the Great Slave Lake and in the Rocky Mountains from latitude 56° southward to Colorado; and on the Western Coast from Fraser's River to California. East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 7–9,000 feet altitude; June–August. (476.)

LONICERA UTAHENSIS. Stem erect; leaves oblong, subcordate at base, obtuse, glabrous, on short (1–2″ long) petioles; peduncles axillary; bracts 2, shorter than the ovaries; teeth of the calyx very obtuse; corolla obtusely saccate at base, bilabiate, the lobes half shorter than the tube; style included; berries red, nearly distinct, diverging.—Shrub 3–5° high, with loose slender spreading branches; leaves 2′ long by 1′ in width; corolla 5″ in length, with a broad (1½″ wide) and rather short tube; berries globular, 2–3″ in diameter, 2 4-seeded, on short peduncles, (½′ long.) Flowers described from a single dried one found among the specimens. Wahsatch Mountains, Utah, in Cottonwood Cañon; 9,000 feet altitude; in fruit, August. (477.)

LONICERA CONJUGIALIS, Kell. *Proc. Cal. Acad.* 2. 67. *Fig.* 15. Stem erect, branching; branches and buds quadrangular; leaves oval-oblong, cordate or subcordate, short-petioled, obtuse or subacute, softly pubescent, thin and reticulate-veined; peduncles filiform, exceeding the leaves, divaricate; bracts minute or none; calyx-teeth minute, subulate, hirsute; corolla dark-purple, glabrous, gibbous at base, deeply bilabiate, lower lip linear and twice longer than the very short tube, the upper one shortly 4-toothed; stamens and the hirsute style equal, included; filaments hirsute below; ovaries connate.—Leaves ½–2′ long. Collected by Dr. Veatch on the Washoe Mountains, Nevada.

SAMBUCUS RACEMOSA, L., Var. PUBENS. (*S. pubens*, Mx.) Leaves variable, ovate or oblong-lanceolate, 2–6′ long and 1–3′ wide, sometimes laciniately serrate at the apex and with a long acumination, pubescent beneath or glabrous. Northern States, and southward in the mountains to Carolina,

from Canada to the Saskatchewan, and in the Rocky Mountains to Colorado; and on the Western Coast from Sitka to the Sacramento. In the Wahsatch and Uintas; 6–9,000 feet altitude; May–August. (478.)

SAMBUCUS GLAUCA, Nutt. Somewhat arborescent, glabrous; leaflets 3–9, lanceolate, acuminate, sharply serrulate, the lower occasionally 3-parted; cyme large and spreading; fruit glaucous-blue.—Growing 6–12° feet high, with a trunk sometimes 6′ or more in diameter; leaflets 2–6′ long, frequently with foliaceous stipellate appendages; fruit of more agreeable flavor than that of *S. Canadensis.* From Washington Territory to Southern California and in New Mexico. In the West and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–7,000 feet altitude; July–September. (479.)

## RUBIACEÆ.

GALIUM BIFOLIUM. Annual, erect, simple or branched, glabrous, unarmed; leaves 4–6″ long, opposite, with occasionally an additional pair of smaller stipules, oblong-lanceolate, usually acute, faintly 3-nerved; peduncles axillary and terminal, 1-flowered, about equaling the leaves; corolla very minute, white, with rounded lobes; fruit hispid with hooked bristles.—Low, (2–8′,) with the branches alternate and opposite to a 1-flowered peduncle; fruit ¾″ in diameter. In the Trinity, Battle and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–7,000 feet altitude; May–July. PLATE XIV. Fig. 8. A plant; natural size. (480.)

GALIUM APARINE, L. Northern States and Canada, perhaps introduced; on the Western Coast from Unalaska and Sitka to California; Sonora and Arizona, to Western Texas. On the foot-hills through Nevada and about Salt Lake Valley; 5–6,000 feet altitude; May–July. (481.)

GALIUM ASPERRIMUM, Gray. *Plant. Fendl., p.* 60. Annual, diffusely branching, the angles retrosely aculeolate; leaves 6 in a whorl, lanceolate, attenuate at base, or the lower obovate-lanceolate, setaceous at the apex, glabrous and shining, the margins and midvein beneath very rough with reflexed prickles; the leaves upon the branches small and much shorter than the peduncles; cyme several-flowered, dichotomous, panicled; petals white or purplish, rather large; ovary covered with short hooked hairs.—Stems weak, 2° in height; lower cauline leaves 9–12″ long; flowers 1″ or more in diameter; the mature fruit has not been collected. New Mexico and Cali-

fornia, (6350 Bolander.) Ruby Valley, Nevada; 6,000 feet altitude; August. (482.)

GALIUM BLOOMERI, Gray. *Proc. Amer. Acad.* 6. 538. Perennial, suffrutescent at base, glabrous, unarmed, erect, diffusely branched; leaves in fours, sessile, broadly ovate, cuspidate-acuminate, somewhat 3-nerved, opaque, the floral ones often only opposite; flowers ochroleucous, by abortion diœcious, the staminate short-peduncled and cymose, the pistillate subsolitary; fruit densely hirsute.—Stems paniculately branched, 3–12′ high; leaves 2–5″ in length, often nearly orbicular, somewhat rigid, shorter than the fruiting pedicels; fruit 1″ in diameter, occasionally nearly naked, with a few hairs at base. Found by Dr. Bloomer near Virginia City; also collected by Stretch, and not rare on the Washoe and West Humboldt Mountains; 5–8,000 feet altitude; May–September. (483.)

GALIUM MULTIFLORUM, Kell. *Proc. Cal. Acad.* 2. 97. *Fig.* 27. (*G. hypotrichium*, Gray. *Proc. Amer. Acad.* 6. 538.) Perennial, suffrutescent at base, minutely scabrous or sometimes aculeolate, erect, branched; leaves in fours, sessile, roundish ovate to oblong-lanceolate, apiculate, somewhat 3-nerved, the floral ones opposite; flowers ochroleucous, diœcious or somewhat monœcious or perfect, solitary or somewhat cymulose; pedicels about equaling the leaves, usually becoming deflexed in fruit; fruit densely hirsute.—Stems 3–6′ high, rather rigid. Much resembling the last, from which it differs in its general scabrous pubescence and deflexed pedicels, which are rather shorter, and the leaves usually more narrow. Discovered in the Washoe Mountains by Dr. Veatch and also found by Brewer at Sonora Pass in the Sierras; frequent in the East Humboldt Mountains, Nevada, and in the Wahsatch; 5–9,000 feet altitude; June–August. (484.)

GALIUM TRIFIDUM, L. From Florida and Western Louisiana northward to the Arctic Circle, and through nearly the whole region westward to the Pacific, but rare between the Mississippi and the Sierras; New Mexico, (Wright,) and in the Wahsatch Mountains; 6,000 feet altitude; June–July. (485.)

GALIUM TRIFLORUM, Mx. From Florida to Louisiana and northward to Canada, and through British America below latitude 55° to the Pacific; Washington Territory to California; Western Texas, (Lindheimer.) In the Clover Mountains, Nevada, and in the Wahsatch and Uintas; 6–7,000 feet altitude; July–September. (486.)

Galium boreale, L. Northern States to the Arctic Ocean and Oregon, and in the Rocky Mountains from Wyoming to New Mexico; Southern California, (Xantus.) East Humboldt Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; June–September. (487.)

## VALERIANACEÆ.

Valeriana dioica, L., Var. sylvatica. (*V. sylvatica*, Rich.) Newfoundland, and from Vermont to Wisconsin and the Saskatchewan, and in the Rocky Mountains to latitude 56°; Oregon, California, (Brewer,) Colorado and New Mexico. Frequent in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6,500–9,000 feet altitude; June–September. (488.)

Valeriana edulis, Nutt. Ohio, Wisconsin and Upper Canada; Washington Territory, Utah and New Mexico. Toyabe Mountains and Ruby Valley, Nevada, and in the Wahsatch; 6,000 feet altitude; June, July. (489.)

Plectritis[1] congesta, DC. Corolla bilabiate, the spur small and much shorter than the tube; flowers capitate, or often verticillate.—Stems 4′–2° high, with leaves 1–2′ and corolla 3–4″ long; ovary pubescent, becoming glabrous. From Washington Territory to Southern California. Frequent in Nevada from the Washoe Mountains to Reese River; Salt Lake Valley, Utah; 5–5,500 feet altitude; April–July. (490.)

## COMPOSITÆ.

BY PROF. DANIEL C. EATON.

Eupatorium occidentale, Hook. Nearly smooth, or puberulent toward the top; stems about 1° high, slender, herbaceous from a somewhat woody base; leaves mostly alternate, on slender petioles, cordate-ovate or somewhat deltoid, 1–1½′ long, more or less toothed, the upper ones often narrower; corymbs rather simple, panicled; heads 15–25-flowered; involucral scales linear-lanceolate, subequal, puberulent; corolla pale reddish-white; achenia slender, glabrous or very sparingly glandular.—Oregon, California and Ne-

[1] PLECTRITIS, Lindl. Calyx-limb truncate, entire, almost none. Corolla-tube gibbous anteriorly, spurred at base; limb 5-cleft, more or less bilabiate. Stamens 3. Stigma capitate. Fruit with a somewhat coriaceous triangular fertile cell; the two empty ones open to the base, forming involute wings.—Annual glabrous herbs, with simple or sparingly branched stems; leaves entire, oblong or obovate-spatulate, sessile; flowers rose-color, aggregated in dense verticillate clusters or capitate; bracts subulate, verticillate and involucellate, united at base.

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vada. Foot-hills and high cañons of the East and West Humboldt Mountains; 6,500–8,500 feet altitude; the more elevated station (East Humboldt Mountains) furnishing dwarfed plants 8′ high with smaller leaves; September. (491.)

BRICKELLIA[1] OBLONGIFOLIA, Nutt. Viscidly puberulent; stems 6–12′ high, several from a suffrutescent base; leaves numerous, alternate, sessile, elliptical-oblong, entire, 3-nerved, 8–12″ long; heads large, solitary or few, terminating short leafy branches; involucral scales imbricated in 3 or 4 series, outer ones ovate-oblong, inner ones lance-linear, acute; flowers about 30; branches of the style somewhat exserted; achenia minutely glandular or obscurely setulose along the striæ; pappus slightly plumose, exceeding the involucre, but shorter than the corolla.—British Columbia (Lyall!) and Oregon. An excellent figure is given on Plate IX of Torrey's unpublished report on the Western North American botany of Wilkes's Expedition. Var. ABBREVIATA, Gray MSS. A dwarfed form, 4–8′ high, with oblong leaves, 5–6″ long; heads solitary or very few; achenia glandular only.—West Humboldt Mountains; 8,000 feet altitude; September. PLATE XV. Fig. 7. A single stem; natural size. Fig. 8. A leaf; enlarged two diameters. Fig. 9. A corolla, expanded; enlarged four diameters. Fig. 10. An achenium; enlarged eight diameters. (492.)

BRICKELLIA LINIFOLIA. Minutely glandular-puberulent; stems very numerous, 12–16′ high from a stout woody base, corymbose at the summit; leaves numerous, alternate, sessile, elliptical-lanceolate, entire, obscurely 3-nerved, 9–12″ long; heads large, solitary on elongated somewhat leafy branches; involucre 40–50-flowered, the scales in several series, outer ones ovate, inner ones linear, acute; branches of the style club-shaped, exserted; achenia with a double row of minute bristles along the striæ; pappus obscurely plumose.—Sandy bottoms of American Fork, Jordan Valley, Utah; July. Near the last, but a larger plant, with narrower leaves, and a setulose, not glandular achenium. PLATE XV. Fig. 1. A single stem; natural size. Fig. 2. A leaf; enlarged two diameters. Fig. 3. An achenium; and Fig. 4.

[1] BRICKELLIA, Ell. Gray, in *Pl. Wright.*, 1. 84. Heads 4–50-flowered. Involucre imbricated, the scales striated, outer ones shorter. Receptacle flat, naked. Flowers all tubular, the corolla white or yellowish, cylindrical, scarcely expanded toward the summit, the teeth very short. Base of the style bulbous and often villous. Achenia with ten striæ, sometimes obscurely 5-angled. Pappus of scabrous barbellate or slightly plumose bristles.—Perennial herbs or suffruticose plants, with opposite or alternate leaves, and frequently the habit of *Eupatorium*.

A pappus-bristle; enlarged eight diameters. Fig. 5. The style. Fig. 6. An anther; both enlarged four diameters. (493.)

BRICKELLIA MICROPHYLLA, Gray. Viscidly pubescent and glandular; stems 12–18′ high, much branched from a woody base; leaves alternate, short-petioled, ovate, coarsely toothed, 4–7″ long, those of the branchlets much smaller and sessile; heads small, 15–20-flowered, clustered at the ends of the branchlets; involucral scales imbricated in many rows, outer ones ovate, herbaceous, with squarrose tips, inner ones erect, lanceolate, acute; pappus scabrous; achenia slightly setulose.—Oregon, on the Walla-Walla, Nuttall. East Humboldt Mountains, Nevada, and mouth of American Fork Cañon, Utah; on rocks at about 6,000 feet elevation; July, August. (494.)

BRICKELLIA CALIFORNICA, Gray. Scurfy-puberulent; stems numerous from a woody base, 1½° high, branching; leaves 9–20″ long, thickish, alternate, petioled, deltoid-ovate or subcordate, acutish, dentate, obscurely 3-nerved from the base, the under surface reticulated; heads medium-sized, nearly sessile in short axillary racemes, 10–12-flowered, (about 20-flowered, *T. & G.;*) involucral scales imbricated, obtuse, the outer ones appressed, very short, inner ones erect, elongated; achenia minute, finely pubescent, obscurely striate; pappus scabrous.—*B. tenera* and, perhaps, some other New Mexican forms will probably be reduced to this species. The appressed scales and larger leaves easily distinguish it from the last. California to New Mexico. Robert's Station, Nevada; City of Rocks, Southern Idaho, and mouth of American Fork Cañon, Utah; 5–6,000 feet elevation; July–October. All but the Idaho specimens are immature. (495.)

BRICKELLIA GRANDIFLORA, Nutt. Stem 2–2½° high, rather stout; leaves opposite or alternate, long-petioled, cordate-triangular, about 2′ long, acuminate, coarsely serrate, glabrous or slightly pubescent, often resinous-dotted beneath; heads middle-sized to very large, short-peduncled, clustered at the ends of the panicled or sometimes corymbose branches, about 30-flowered; involucral scales much imbricated, outer scales herbaceous, ovate with long subulate spreading tips, inner ones elliptical, acute, with scarious margins; achenia sparingly setulose toward the summit.—Colorado and New Mexico to Oregon and California. East Humboldt Mountains and in the Wahsatch; 6–8,000 feet elevation; August. (496.)

BRICKELLIA ATRACTYLOIDES, Gray. *Proc. Amer. Acad.* 8. 200. "Shrubby, much branched, scarcely 1° high; branchlets leafy, puberulent, monoceph-

alous; leaves very rigid, somewhat alternate, subsessile, ovate-lanceolate, spinulose-acuminate and few-toothed, 3-nerved; the nerves and veins curved upward, anastomosing and rather prominent; both surfaces alike, scabrous and sprinkled with minute globules; peduncles 1–2-bracteolate, twice or thrice longer than the many-flowered (half-inch-long) heads; scales of the bell-shaped involucre in few rows, the outer scales ovate- the inner linear-lanceolate, all suddenly acuminated; achenia slightly hirsute along the ridges; setæ of the pappus about 20, very faintly barbellate, at least near the base.—Utah, near the Rio Colorado, 1870, (Dr. E. Palmer.) Leaves less than an inch long, coriaceous and rigid, tapering into a spinulose point and beset with a few rigid spinulose teeth. This species would naturally be associated with *B. spinulosa* of Northern Mexico, but it has forty or more flowers in the head and a minutely barbellulate or above merely scabrous pappus."—Gray, *l. c.*

Aster adscendens, Lindl. "Stems low, ascending; the branches simply racemose or somewhat corymbose; radical and lower leaves oblong-linear or narrow spatulate, glabrous, entire, with ciliate-scabrous margins; the cauline linear-lanceolate, partly clasping; scales of the hemispherical involucre numerous, closely imbricated, unequal, nearly glabrous; the exterior linear-oblong, obtuse, the innermost acute; achenia minutely hairy." *T. & G.* Saskatchewan and along the Rocky Mountains to Colorado, (Vasey, 251.) Var. Parryi. Stems 1–2° high, often corymbosely much branched; lower leaves large, broadly oblanceolate, 5–12′ long, 1–2′ wide, narrowed into winged petioles, the upper ones gradually smaller and sessile, partly clasping; heads large; involucral scales finely ciliate, the outer ones broadly lanceolate and herbaceous.—Approaches *A. integrifolius*, but the involucre is not glandular. Colorado, (417 Parry; 253 Hall & Harbour, in part.) In valleys and along creeks, from the East Humboldt Mountains to the Uintas; July–October. (497.)

Aster Nuttallii, T. & G. Stems 1–2° high, rather slender, smooth or nearly so; leaves rather rigid, minutely scabrous on the edges and often on the upper surface; the radical and lower ones narrowly lanceolate, 3–4′ long, 3–4″ wide, tapering into a slender petiole; upper ones narrowly linear and passing on the branchlets into subulate bracts; heads small, terminal on the panicled and spreading or somewhat corymbose very slender branchlets; involucres hemispherical-top-shaped, 3–4″ broad at the top in the living plant, the scales closely imbricated, linear-spatulate, obtuse, outer ones very small

and slightly spreading, inner ones appressed, chartaceous with greenish tips.—Plains of the Snake River, (Nuttall.) Valleys of Nevada and Northwestern Utah; 4,500–6,000 feet elevation; June–October. Very near the next, but it may generally be distinguished by its more slender habit and very narrow leaves. (498.)

Aster falcatus, Lindl. Stems minutely pubescent with appressed hairs, 1–1½° high, leafy to the top; leaves rigid, minutely appressed-pubescent, or smoothish except on the edges; the lower ones spatulate-lanceolate, often obtuse, 2–3′ long, 4–6″ wide, short-stalked; the upper ones oblong-linear, sessile, often slightly clasping, those on the mostly erect branches linear, but never subulate; heads terminal on the branchlets; involucre flattened-hemispherical, 4–5″ wide on the fresh plant; scales much imbricated, the outer smaller, all with greenish appressed or slightly spreading acute tips and whitish chartaceous margins; achenia pubescent.—This species must include *A. campestris* and *A. ramulosus* of Nuttall. Arctic America to Oregon, California, Nevada (Anderson) and Wyoming. Virginia Mountains and in the Wahsatch; 6,000 feet elevation; July–October (499.) A form with wider leaves, slightly larger heads, and a harsher pubescence was collected on the Truckee River and in the West Humboldt Mountains, (500,) and a still larger and much branched plant, with something the habit of *A. oblongifolius*, at Brigham City, Utah. (501.)

Aster Bloomeri, Gray. *Proc. Amer. Acad.*, 6. 539. Low, somewhat tufted and spreading; branches 4–8′ long, leafy; leaves small, 3–6″ long, oblong-linear or the lowest linear-spatulate, sessile, 1-nerved, hispidly scabrous and ciliolate; heads terminal, single; involucre hemispherical, 3–4″ wide; the scales loosely imbricated in about 3 series, linear-lanceolate, herbaceous along the midvein and at the apex, minutely glandular; rays pale purplish; achenia pubescent.—A small, irregularly growing species, with rigid assurgent and branching stems and very scabrous foliage, referred by Dr. Gray, though with some hesitation, to the *Ericoidei*. On Mt. Davidson, Nevada, (H. G. Bloomer.)

Aster simplex, Willd. Common in the Atlantic States; Canada, Wisconsin, and California, (Brewer.) To this species is referred a plant 1½° high, densely branched above; leaves scabrous-ciliate on the margins, nearly entire; the larger ones linear-lanceolate, 2–3′ long, 3–4″ wide; upper ones oblong-linear, slightly clasping; heads very numerous, in dense terminal co-

rymbs; involucre hemispherical; the outer scales rather loosely appressed, herbaceous, smooth, linear-spatulate, acute; inner ones lanceolate, with chartaceous margins; rays white.—It is apparently intermediate between *A. multiflorus* or *A. falcatus* and *A. simplex*, and its place cannot be fixed satisfactorily before a general revision is made of North American Asters. Truckee Meadows, Nevada, (W. W. Bailey.) (502.)

Aster carneus, Nees., Var. subasper, T. & G. Indiana and Missouri to Texas. Foot-hills of the East Humboldt Mountains; 6,000 feet elevation; August. Plant with purplish-red stems and narrowly lanceolate leaves, the upper surface roughened with short appressed hairs. (503.)

Aster Douglasii, Lindl. Stems erect, about 4° high, nearly or quite smooth, paniculately branching above; leaves thin, smooth, serrated or entire; the radical ones on long slender winged petioles, broadly lanceolate, often ample, 6–9′ long, 1–2′ wide; lower stem-leaves lanceolate or linear-lanceolate, sessile or short-stalked; uppermost ones linear, all of them acute; heads large, peduncled, single or 3–5 together at the ends of the branches; scales of the hemispherical involucre rather large, loosely imbricated in about 3 rows, smooth, broadly linear or the outer ones spatulate, the base chartaceous, the tips green, slightly spreading; rays large.—Oregon and California. Valleys and cañons from the West Humboldt Mountains to the Wahsatch; 6–8,000 feet elevation; July–September. (504.) Another form with rather broad thickish leaves, mostly somewhat scabrous on the upper surface, was collected on the Virginia and West Humboldt Mountains, at 6–7,000 feet elevation. (505.)

Aster æstivus, Aiton. Arctic America to Oregon and California, and eastward to Ohio. Goose Creek Valley, Northeastern Nevada; 6,000 feet elevation; September. A form differing from that occurring eastward in having the leaves rigid and very scabrous on the upper surface, and the outer involucral scales entirely herbaceous and very long and loose. (506.)

Aster Kingii. Dwarf; stems mostly single from a short erect caudex, 2–3′ high, finely pubescent; radical leaves numerous, a little shorter than the stems, lanceolate-spatulate, acute, glabrous, narrowed into a slightly ciliate petiole, obscurely 3-nerved; stem-leaves 2–3, linear or narrowly spatulate; heads solitary, rather large; scales of the hemispherical involucre imbricated in about 4 rows, linear-acuminate, about 4″ long, glandular-puberulent, all but the innermost with long spreading or reflexed herbaceous points; rays

rather long, white; achenia pubescent.—By its dwarf habit this is an *Oritrophium*, but the long and lax involucral scales, imbricated in several rows, point to the *Grandiflori* for a perhaps more real affinity. Wahsatch Mountains, above Cottonwood Cañon; 9,000 feet altitude; August. PLATE XVI. Fig. 1. A plant; natural size. Fig. 2. A leaf. Fig. 3. An outer involucral scale. Fig. 4. An inner involucral scale; enlarged two diameters. Fig. 5. A ray-flower; enlarged four diameters. Fig. 6. Style of the disk-flower; enlarged eight diameters. (507.)

ASTER GLACIALIS, Nutt., (including *A. Andinus*, Nutt.) Dwarf; caudex woody and often stout, much branched; stems 2–4′ high; leaves thickish, glabrous, the radical ones 1–2′ long, 2–4″ wide, spatulate, narrowed into a long petiole, obtuse or even emarginate; cauline ones few, oblong or oblanceolate; heads solitary; scales of the involucre nearly equal, linear-spatulate or more or less acuminate, glandular-puberulent or nearly glabrous, commonly blackish-purple; rays numerous, white or purplish.—High peaks, from the mountains of Colorado to California. East Humboldt Mountains and North Clover Peak, Nevada, at 10,000 feet altitude, and in the Uintas, near Bear River Cañon, 9–12,000 feet; July–September. (508.) Another form, with narrowly spatulate leaves about 1′ long and not over a line in width, the involucral scales long-acuminate, green with reddish tips, was found in the East Humboldt Mountains also, and on South Clover Peak. (509.)

ASTER ASPERUGINEUS. Stems 2–6′ high, simple, ascending from a sparingly branched woody caudex, like the leaves subcinereous and roughened with a minute scabrous pubescence; radical leaves roundish-obovate or spatulate, narrowed into a long petiole, stem-leaves linear, 1-nerved; heads solitary; involucre hemispherical; scales appressed, imbricated in about 2 rows, the outer ones oblong, subacute, herbaceous, pubescent with whitish hairs, the inner linear, somewhat acuminate, roughened-puberulent; rays purple; achenia pubescent.—Leaves 3–4″ wide, and with the petiole 1–2′ long. Ridge near Lake Marian, East Humboldt Mountains; 9,000 feet elevation; August. (510.)

ASTER SALSUGINOSUS, Rich. Stems erect, 6–18′ high, few from a woody caudex, leafy; radical leaves broadly spatulate or linear-obovate, with the margined petiole 2–9′ long, 4–12″ wide, obtuse, glabrous, ciliolate; cauline ones lanceolate, the uppermost sessile and partly clasping; heads very large, single or 3–5 on long peduncles; scales of the involucre nearly equal,

minutely glandular-pubescent, numerous, narrowly linear, the long acuminate tips recurved and often blackish; rays long, bright purple; achenia somewhat hairy.—Subarctic America to California and Colorado. East Humboldt Mountains, Wahsatch and Uintas; 8–11,000 feet altitude; July, August. (511.)

Var. SCAPOSUS, T. & G. "Cæspitose, dwarf; scape slightly exceeding the obovate-oblong radical leaves, naked, or with a few bracts, bearing a single head."—Wahsatch Mountains, near Cottonwood Lake; 9,500 feet elevation. Scape 6′ high; leaves 2′ long, 6″ wide; rays white; not exactly Frémont's plant, but very near it. (512.)

ASTER PULCHELLUS. Dwarf; caudex woody, erect, mostly simple, the surface corrugated transversely and the upper part covered with vestiges of former leaves; stems assurgent, 2–3′ high; leaves subcoriaceous, rigid; the radical ones glabrous, linear-spatulate, 1–2′ long, about 1″ wide, 1-nerved and with a few indistinct veins; the cauline ones few and small, linear, somewhat falcate, clasping; the uppermost subulate, slightly pubescent, as is the upper part of the stem; heads medium-sized; involucre broadly obconic; the loosely appressed scales imbricated in several rows, at first sparingly lanulose, oblong or linear-oblong, scarcely acute, outer ones and tips of the inner ones purplish; rays bright-purple; styles of the disk-flowers with lanceolate branches, the stigmatic portion about 3 times shorter than the hispid appendage; achenia smooth or sparingly pubescent; pappus of 25–30 barbellate setæ.—This plant will find its place in the section *Xylorrhiza*, and is nearly related to *A. Andersonii*, from which it differs chiefly in its smaller size, narrowly spatulate and rather obtuse radical leaves, in the lanceolate, not filiform appendages of the style, and in the nearly or quite smooth achenia. Rocks at the base of South Clover Peak; 9,000 feet altitude; September. PLATE XVI. Fig. 7. A plant. Figs. 8, 9. Outer and inner involucral scales; enlarged two diameters. Fig. 10. A ray-flower; four times enlarged. Fig. 11. Its style; enlarged eight diameters. Fig. 12. A disk-flower. Fig. 13. An anther. Fig. 14. The branches of the style; on the same scale. (513.)

ASTER ANDERSONII, Gray. *Proc. Amer. Acad.*, 7. 352. Sparingly lanulose and soon glabrous; stems mostly 6–9′ high, 1–3 from an erect or assurgent woody caudex; radical leaves grass-like, narrowly linear, acute, 3–6′ long, 1–2″ wide, mostly 3-nerved, the cauline gradually smaller, and the uppermost reduced to bracts; heads solitary, rather large; scales of the

hemispherical involucre linear-lanceolate, acute, nearly herbaceous, sub-equal, loosely imbricated in 2–3 series; rays purplish; style of the disk-flowers with filiform branches, the hispid portion 3–4 times longer than the stigmatic; achenia oblong, villous, 4–6-costate; pappus of nearly equal barbellate setæ.—Near Carson City, Nevada, (Dr. C. L. Anderson.) California, (Prof. Brewer and Mr. Bolander.) Involucre 6–9″ wide; the heads 15–18″ in diameter.

Aster elegans, T. & G. Stems several from a short creeping rootstock, 1–2½° high, very leafy; leaves sessile, the lower ones scale-like and soon withering, the others lanceolate, 1–2½′ long, 4–9″ wide, entire, minutely puberulent like the stem, and roughened, obscurely 3-nerved or somewhat feather-veined; inflorescence corymbose; heads peduncled; involucres turbinate-campanulate, 4–6″ wide, the scales ovate or oblong, acute, puberulent, the scarious margins densely lacerate-fringed; rays few, (6–10,) dull pinkish.—Oregon to Wyoming. Mountains of the East Humboldt range, and at the head of Humboldt River, Nevada, and in the Wahsatch; 7–9,000 feet altitude; August, September. (514.)

Var. Engelmanni. (*A. Engelmanni*, Gray, in *Sill. Journal*, *n. s.*, 33. 9.) Larger in every way, the leaves 2½–3′ long, often an inch wide; involucres 7–10″ wide, and the rays 12–18 in number. This passes by insensible degrees into the typical form. Cascade Mountains, latitude 49°, (Lyall,) to Colorado. East Humboldt and Clover Mountains, Nevada, Wahsatch and Uintas; 7–10,000 feet altitude; July–September. (515.)

Aster glaucus, T. & G. Stems leafy, erect, 1–1½° high, from a slender creeping rootstock; lowest leaves squamiform; the others oblong-linear, 2–3′ long, 4–6″ wide, sessile, pointed, smooth and glaucous, one-nerved, veins prominently reticulated; heads corymbose; involucre campanulate, the scales loosely imbricated in 3 or 4 series, lacerate-fringed, outer ones oval, herbaceous, inner ones lanceolate, membranous, acute, purple-tinged; rays 14–17, pinkish-white; achenia smooth or slightly pubescent.—One of the most distinct and elegant of the genus. Heads when fully expanded 15″ broad. Wyoming and Colorado. Echo Cañon, in the Wahsatch, and Bear River Cañon, Uintas; 6–8,000 feet elevation; July, August. (516.)

Aster angustus, T. & G. Annual or biennial, 6–20′ high, branching from the base; branches panicled; leaves linear or linear-spatulate, smooth and somewhat fleshy, entire, 2–3′ long, heads everywhere, crowded; involucres 4–6″ wide, ovate-hemispherical; the scales loosely imbricated in 2 or 3

series, the outer ones broadly spatulate, herbaceous, inner ones longer and with membranaceous margins, innermost occasionally very long and narrow, almost wholly membranaceous; ray-flowers with a very short ligule or only a slender truncated tube much shorter than the style; disk-flowers numerous, very slender; achenia densely pubescent; pappus very copious, considerably exceeding the involucre.—Slave Lake and Saskatchewan to California, Colorado and New Mexico. Valleys from the West Humboldt Mountains to the Wahsatch; May–September. (517.)

TOWNDSENDIA[1] SCAPIGERA. Canescent with fine appressed hairs; caudex perennial, bearing a tuft of leaves with a roundish or obovate sometimes emarginate lamina, narrowed into a petiole 1–2′ long, and giving rise to several naked or 1–2-bracted monocephalous scapes 2–3′ high; involucre 6–8″ wide, the scales imbricated in about two rows; the outer ones ovate-oblong, mostly herbaceous, hairy; inner ones oblong-lanceolate, the scarious margins slightly fringed, and pinkish towards the tips; ray-flowers twice as long as the involucre, mostly fertile; pappus as long as the achenium, that of the disk-flowers rather longer.—Flowers dull-pinkish. This will rank with *T. sericea* and *T. incana*, on account of the perennial root and well-developed pappus of the ray, though in the following variety it approaches the habit of *Nanastrum*. Dry rocky ridges in the Trinity and Pah-Ute Mountains, Nevada; 5–6,000 feet elevation. May, June. PLATE XVII. Fig. 1. Plant; natural size. Fig. 2. Ray-flower. Fig. 4. Disk-flower. Fig. 6. Anther; each enlarged three diameters. Fig. 3. Pappus-bristle of ray-flower. Fig. 5. Same of disk-flower; enlarged eight diameters. Fig. 7. Style of disk; enlarged ten diameters. (518.)

Var. CAULESCENS. Stems 4′ long, sending out leafy branches near the base; leaves narrowly linear-spatulate, 2½′ long; heads rather smaller; in other respects like the type.—Monitor Valley, Nevada, 5,500 feet elevation; July. (519.)

TOWNSENDIA STRIGOSA, Nutt. Annual, canescent with a fine appressed

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[1] TOWNSENDIA, Hook. Heads large; the rose-colored or whitish rays in one series, rather long, pistillate, sometimes infertile; disk-flowers perfect, with tubular-obconic 5-toothed corollas. Branches of the style lanceolate, acutish, hairy towards the ends. Involucres hemispherical or sub-globose, of numerous rather large, imbricated and appressed, scarious-margined lacerate-fringed and often tinted scales. Achenia flattened, pubescent or hairy, 2–3 nerved. Pappus of numerous stout barbellate bristles, that of the ray commonly shorter, or reduced in part or wholly to short subulate bristles or little scales.—Dwarf, stemless or branching, annual or perennial herbs, with crowded, linear or spatulate, entire radical leaves.—Natives of the mountainous regions east of the Sierras, from the Saskatchewan to New Mexico.

pubescence; stems many, branching, 3–6′ long; leaves linear-spatulate, 9–15″ long; heads showy, very many, sometimes leafy-bracted, but mostly on naked peduncles 1′ long; involucre hemispherical, 5–6″ wide, the scales in about 3 series, the broad white scarious margins deeply fringed; rays pink; pappus of the ray composed of minute lacerate scales ¼″ long, that of the disk of stout bristles 1½″ long, with a few shorter ones intermixed; achenia minutely pubescent.—Wyoming to Arizona and New Mexico. Shore of Stansbury Island, Great Salt Lake, 4,250 feet elevation; June. (520.)

MACHÆRANTHERA[1] CANESCENS, Gray. *Pl. Wright.*, 1. 89. Commonly canescent with a minute soft pubescence; stems several from a usually biennial root, 6–18′ high, much branched; leaves spatulate or somewhat lanceolate, all but the lowest sessile, usually pinnately dentate with sharp recurved teeth, varying to entire, obtuse or acute, often mucronulate; heads many, panicled or somewhat corymbose; involucres 4–5″ wide, the scales ovate, oblong or even linear, with rather acute, herbaceous, puberulent or viscidly glandular tips, the outer ones shorter and squarrose or recurved; achenia pubescent.—Oregon to Arizona and Texas, Wyoming and Colorado. A most variable plant, several forms occurring in this collection.

1. Glabrous, much branched; leaves spatulate, more or less toothed; involucral scales lanceolate, minutely resinous, the tips green, squarrose.—Valleys of Central Nevada; 6,000 feet elevation; July, August. (521.)

2. Minutely pubescent, many stemmed; leaves spatulate, entire or few-toothed at the apex; scales ovate-oblong, the tips green, squarrose.—Bear River Cañon, Uintas; 8,000 feet elevation; August. (522.)

3. Minutely canescent, mostly branched; leaves oblanceolate or spatulate, often broadly so, more or less spinulose-toothed; involucre of lanceolate appressed scales, the tips slightly spreading.—The commonest form and near to var. *latifolia*, but the involucral scales are not subulate. Mountains and foot-hills, from Western Nevada to the Wahsatch; June–September. (523.)

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[1] MACHÆRANTHERA, NEES. Heads many-flowered; the rays conspicuous, pistillate, fertile, in one species neutral; disk-flowers perfect, the corolla tubular, 5-toothed. Involucre ovoid-hemispherical, the scales imbricated in several series, oblong or linear, with spreading or recurved herbaceous points. Receptacle flat, honeycombed, the cells with toothed edges. Appendages of the style narrowly lanceolate, minutely hirsute. Anthers said to have "cultriform appendages." Pappus of numerous very unequal scabrous and rather rigid bristles, that of the ray-flowers somewhat shorter. Achenia obovate-fusiform, slightly compressed, indistinctly striate, pubescent or silky.—Herbs, annual, biennial or perennial, with branching stems and pinnatifid, toothed or even entire leaves. Genus very near to *Aster*, but may be easiest distinguished from it by the unequal pappus of disk and ray. Consists of four species, found in the region extending from Oregon to Colorado and southward to Mexico.

4. Minutely canescent, much branched; leaves rigid, channeled, pinnately lobed with hooked spiny-pointed teeth; involucre obconical; the scales viscid-pubescent, tips squarrose.—(*Dieteria viscosa*, Nutt.) Virginia Mountains, Humboldt Valley, and Holmes Creek Valley, Nevada; 6,000 feet elevation; September. (524.)

5. Minutely canescent; leaves oblanceolate, entire, mucronate; head rather large; scales lanceolate, scarcely spreading.—Ridge near Parley's Park, Utah; 7,000 feet altitude; July. A single immature specimen. It is very nearly the form called *Dieteria incana* by Torrey and Gray. (525.)

Diplopappus ericoides, T. & G. Stems 2–6′ high, tufted and branching from the suffrutescent base, canescent with exceedingly minute appressed hairs; leaves narrowly spatulate or linear, 2–6″ long, crowded, appressed or spreading, rigid, slightly strigillose, glandular-puberulent and conspicuously ciliate with hispid bristles, often bristle-tipped; heads terminal, solitary, rather small; involucral scales loosely imbricated in about 3 series, linear-lanceolate, acute, the narrow scarious margins slightly lacerate-fringed towards the tip; rays rather short, white; outer pappus inconspicuous; achenia pubescent.—Colorado to New Mexico and Northern Mexico. Rocky bluffs near Great Salt Lake, growing in thick patches; 4,500 feet altitude; May, June. (526.)

Diplopappus alpinus, Nutt. Stems 4–6′ high, several from a woody perennial base, naked toward the summit, webby-pubescent, becoming smoothish; leaves crowded, rigid, oblong-linear, 1-nerved, 3–6″ long, mucronulate, minutely serrulate, canescent with fine pubescence and minute glands; heads rather large; involucral scales in 2–3 series, somewhat appressed, lanceolate, acute, glandular-puberulent, the scarious margins fringed; rays long; achenia silky-villous; outer pappus very evident.—Montana (Wyeth;) Southern Idaho, (Burke.) Rocky ridges between the Pah-Ute and East Humboldt Mountains; 5,500 to 6,000 feet elevation; June, July. (527.)

Erigeron Canadadense, L. Canada to Oregon, and south to Texas. Naturalized nearly throughout the world. Truckee Meadows, Soda Lake and Ruby Valley, Nevada; 4–6,000 feet elevation. (528.)

Erigeron compositum, Pursh. Stems 2–6′ high, several from a slender perennial rootstock, scape-like or with a few leaves near the base and one or two linear bracts higher up; leaves long-petioled, hirsute, 2–3 times ternately divided, lobes oblong-linear, obtuse; heads single; involucral scales hirsute,

linear, in two rows, outer ones herbaceous, inner ones with somewhat scarious narrow margins and long slender tips; rays many, twice as long as the involucre; achenia hirsute; pappus of 12–15 bristles as long the disk-corollas, besides an evident outer series of minute setæ.—Greenland and Arctic America to California and Colorado. Uintas, near Bear River; 9–12,000 feet elevation; August. (529.)

Var. DISCOIDEUM, Gray. *Sill. Journ.*, *n. s.*, 33. 8. Rays none, or sometimes present, but shorter than the flowers of the disk.—Colorado, (Parry,) and California, (Bolander.) Higher peaks of Nevada and Utah; 8,500–10,000 feet altitude; June–September. (530.)

ERIGERON BLOOMERI, Gray. *Proc. Amer. Acad.*, 6. 540. Perennial; caudex much branched from a deep fusiform root; stems 3–8′ high, leafy below, naked for several inches below the solitary heads; leaves narrowly linear, almost filiform, 1–3′ long, less than a line wide, somewhat cinereous, like the stems, with a fine appressed pubescence; involucre woolly-pubescent, the scales in a single series, about as long as the disk; rays none; achenia flat, rather narrow, finely hirsute towards the summit; pappus simple, the bristles shorter than the corolla.—Near Carson City, (Anderson,) and near Virginia City, (Bloomer.) Western Nevada to the East Humboldt Mountains; 5–8,000 feet elevation; May–July. (531.)

ERIGERON GRANDIFLORUM, Hook. Perennial, hirsute and somewhat woolly; stems 1–5 in number, 4–8′ high, rather leafy; radical leaves obovate-spatulate, 1½–2′ long, 4–5″ wide, those of the stem smaller and lanceolate; heads large for the plant; involucre very woolly; the scales herbaceous, elongated, with naked purplish tips; rays long and broad, white or purple; achenia sparingly hirsute; pappus of barbellate setæ rather shorter than the disk-corollas, and with a few very short ones intermixed.—Rocky Mountains of British America. On a ridge above Bear River, Uinta Mountains; 11,000 feet elevation; specimens exactly like the figure in Hooker's *Fl. Bor. Amer.*, *t.* 123. (532.)

A smaller form, the leaves narrower, and the heads only half as large, but in all other respects like the type, was also collected on the Uintas near Bear River, elevation 11–12,000 feet. The same form, probably, was found farther north in Palliser's Expedition; See *Pallis. Rep. p.*, 263. (533.)

ERIGERON URSINUM. Perennial, cæspitose; stems hirsutulous, 4–7′

high, simple or sparingly branched, leafy below; leaves all narrowly lanceolate, 12–18″ long, 1½–2″ wide, 1-nerved or indistinctly 3-nerved, ciliate and sparsely pubescent with whitish hairs, the radical narrowed into a very short hairy petiole; heads not large; involucral scales in two series, narrowly lanceolate, the outer greenish, hirsute, minutely glandular, the inner chartaceous with a dark midvein; rays purple, about 50, twice longer than the involucre, about ½″ wide; achenia hirsute; pappus with minute bristles intermixed with the longer ones.—This species will come into *Euerigeron*, and should be placed near *E. grandiflorum*, from which, and from *uniflorum*, the lack of wool on the involucre, besides the other characters, distinguishes it. The caudex branches below the surface of the ground, and is often surculose, as in many Asters. Uinta Mountains, on the ridge above Bear River Cañon; 10,000 feet elevation; August. (534.)

ERIGERON ACRE, L. Annual and perennial; stems 1-several, 6–10′ high, leafy, racemosely or somewhat corymbosely branched above, finely hirsute with spreading whitish hairs, and glandular towards the summit; radical leaves obovate, narrowed into a slender winged stalk, ciliate and sparingly pubescent; cauline ones from spatulate becoming linear; heads small; involucre in about 2 series, the scales linear-acuminate, outer ones glandular and somewhat hirsute, inner ones very narrow, smooth with the tip glandular; rays pinkish, equaling or slightly exceeding the disk, only $\frac{1}{100}$ of an inch in width; inner pistillate rayless flowers very numerous, the slender tube half as long as the style; achenia flat, more or less hirsute; pappus of a few very fragile bristles longer than the disk-flowers.—British America to Lake Superior, Colorado and California; also in Europe and Asia. Uintas, Bear River Cañon; 8–10,000 feet altitude; July, August. (535.)

ERIGERON LONCHOPHYLLUM, Hook. (*E. racemosum*, Nutt.) Perennial; stems leafy, softly hirsute with spreading hairs, 4–12′ high, numerous from a very leafy cæspitose base; leaves 2–4′ long, 1–3″ wide, hirsutely ciliate and somewhat pubescent, the radical oblanceolate and narrowed into a long slender petiole, the cauline linear and grassy; heads racemose on long peduncles, small; involucral scales linear, acute, hirsute with white hairs; rays very narrow, (as in *E. acre*,) exceeding the disk about 1″; tubular pistillate flowers none; achenia sparingly pubescent; outer pappus of minute setæ, evident, inner bristles a little shorter than the disk-flowers.—Saskatchewan to California and Colorado, (Vasey 245, in part.) Diamond Valley, Nevada, and

Silver Creek Cañon in the Wahsatch; 6,000 feet elevation; July. In appearance much like *E. acre*, but it has a denser and softer pubescence and more numerous stems, and, as noticed by Nuttall, it lacks the tubular pistillate flowers of that species. (536.)

ERIGERON BELLIDIASTRUM, Nutt. Annual; stem corymbosely much branched and leafy throughout, like the leaves densely hirsute-pubescent; radical leaves with slender petioles, entire and oblanceolate, or sometimes pinnately 3–5-lobed; cauline ones sessile, oblong-linear or linear-spatulate; heads few or many, rather small; involucre hirsute-canescent; rays very many, (60–70,) white or pale red, narrowly linear, twice or nearly thrice as long as the involucre; achenia slightly pubescent; pappus plainly double, the outer of minute squamellate setæ.—Nebraska to the Rio Grande; Mt. Davidson, Nevada, (Bloomer.) Stream banks and meadows from the Truckee to the Wahsatch; 4,500–5,000 feet elevation; May–August. The outer pappus has been strangely overlooked; it shows plainly in 246 Hall & Harbour. (537.)

ERIGERON MACRANTHUM, Nutt. Stems 9–30′ high, several from a perennial somewhat creeping rhizoma, mostly smooth or slightly hairy, leafy to the summit; leaves ciliated and sometimes more or less pubescent; radical ones oblong-spatulate, petioled, 2–4′ long, 6–8″ wide; the cauline shorter, oblong or broadly ovate-lanceolate, partly clasping; heads several, (3–13,) corymbosely arranged on long peduncles, very large, with the very narrow and exceedingly numerous purplish rays often nearly 2′ broad; involucre of many very narrow linear-acuminate herbaceous glabrous or glandular scales; achenia 2–3-nerved, slightly hairy; outer pappus of short slender setæ.—Saskatchewan to Utah and New Mexico. Wahsatch and Uinta Mountains; 6–8,000 feet altitude; July. (538.)

ERIGERON GLABELLUM, Nutt. Stems 9–18′ high, single or few from a short erect caudex, simple or sparingly corymbose at the summit, pubescent or nearly hispid; leaves sometimes glabrous but commonly pubescent, entire or sparingly toothed; radical ones spatulate, tapering into a long petiole, 2–4′ long, 4–6″ broad; the cauline scattered, oblong-lanceolate, the uppermost linear, sessile and partly clasping; heads few, large, 10–15″ broad, the rays very narrow and numerous; involucre pubescent or somewhat hirsute; achenia and pappus as in the last.—An unsatisfactory species, very near the last, and passing into it by such forms as Var. *molle*, Gray, *Proc. Phil. Acad.*, March 1863, *p.* 64. Alaska and Mackenzie River to Oregon, and eastward

to Nebraska. Salt Lake Valley, and Parley's Park, Wahsatch Mountains; 4,300–6,000 feet elevation; June, July. (539.) To this species is also referred a plant with shorter and broader rays, rather broader leaves, and a coarser pubescence, apparently as near to *E. bellidifolium* as to *E. glabellum.* Meadow near head of Cottonwood Cañon, Wahsatch; 8,500 feet elevation; July. (540.)

ERIGERON PUMILUM, Nutt. Very hirsute with spreading hairs; stems 6–10′ high, often many from an erect branching perennial caudex, simple and monocephalous or with 2–3 peduncled heads, leafy; lower leaves linear-spatulate, 2–2½′ long, 1″ wide, upper ones narrowly linear, passing into subulate bracts; heads about 1′ broad; involucres of many subequal narrow linear hirsute scales; rays white; $\frac{1}{30}$′ wide, twice or nearly 3 times as long as the involucre; achenia slightly hairy; outer pappus of minute subulate bristles.—Plains of Dakota and Nebraska to New Mexico. Valley of Great Salt Lake; May, June. (541.)

ERIGERON CONCINNUM, T. & G. Canescent with harsh spreading hairs; stems 6–10′ high, often several from an erect perennial caudex, leafy, branching; lower leaves linear-spatulate, 3′ long, 1–1½″ wide, upper ones linear; heads 10–12″ broad; involucre of many very narrow hirsute or pubescent scales; rays blue, $\frac{1}{30}$′ wide, as long as in the last or longer; achenia hirsute; outer pappus of narrow squamellæ.—Oregon to Utah; Salt Lake Valley, (Stansbury.) Havallah Mountains and Ruby Valley, Nevada; 5,500–6,000 feet elevation; June, July. (542.)

Var. CONDENSATUM. Stems low, 2–3′ high, mainly monocephalous, very numerous and crowded from a stout woody branching caudex; leaves 1–1½′ long, ½–1″ wide, somewhat rigid and exceedingly hirsute; outer pappus of rather wide rigid and slightly toothed squamellæ.—Ridge at Roberts' Station, 6,000 feet, and East Humboldt Mountains, 8–9,000 feet altitude; July. (543.)

Var. APHANACTIS, Gray. *Proc. Amer. Acad.*, 6. 540. Like the type, but the rays much reduced and shorter than the style.—Carson City, (Anderson.) Virginia City, (Bloomer.) Foot-hills near Unionville, and mountain-side above Sulphur Spring Station, Nevada; 5–6,000 feet elevation; June, July. (544.)

ERIGERON BREWERI, Gray. *Proc. Amer. Acad*, 6. 541. "Minutely cinereous-pubescent; stems 9–12′ high, leafy to the top, rising from a slender creeping rootstock; leaves oblanceolate or linear-spatulate, (1′ long, 1″ wide,)

1-nerved, entire; peduncles short; involucre nearly glabrous, half as long as the matured disk-flowers; the scales in 2–3 series, unequal; rays in 1 series, elongated, apparently purple; achenia sparingly pubescent; pappus double, the outer of short bristles."—Heads when expanded about 9″ broad. California, (240 Bridges;) Yosemite Valley, (Brewer.) A dwarfed and irregularly branched form was collected near Carson City by Dr. Anderson. Star Peak; 10,000 feet elevation; September. (545.)

ERIGERON OCHROLEUCUM, Nutt. Pubescent with appressed hairs; stems several or many, assurgent, spreading from the top of a perennial fusiform simple caudex; radical leaves many, narrowly linear or filiform, 2–3′ long, ½–1″ wide, 1-nerved, narrowed into a petiole; cauline ones smaller, sessile; heads terminal, solitary, or 3–5 on a stem, about 8″ broad; involucre pubescent, the linear-lanceolate scales in 1–2 series, subequal, as long as the disk; rays whitish, (yellowish-white, Nuttall;) achenia pubescent; outer setæ of the pappus minutely subulate.—Oregon. Uintas, on the divide west of Duchesne River, and on a ridge above Bear River Cañon; 10,000 feet altitude; July, August. (546.)

ERIGERON STENOPHYLLUM. Smooth; caudex perennial, woody, branched, erect or assurgent; stems many, strict, 6–9′ high, sparingly branched toward the summit; radical leaves crowded, linear-spatulate or filiform, 1-nerved, with the petiole 1–2′ long, ½–¾″ wide, the cauline gradually smaller, filiform, the uppermost minute and bractlike; heads one or few, 5–6″ wide; involucre and peduncles glandular-puberulent, the scales loosely imbricated in several series; the outermost minute, inner ones oblong-linear, acute; rays blueish, 20–30, twice as long as the disk; style of the disk-florets with rather acute hispid appendages nearly as long as the stigmatic portion; achenia 2-nerved, sparsely hispid; pappus of 15–16 unequal barbellate setæ, nearly as long as the disk-corollas, and a few minute subulate ones intermixed.—Rocky gulch above Cottonwood Cañon, Wahsatch Mountains; 8–9,000 feet altitude; August. PLATE XVII. Fig. 8. Plant; natural size. Fig. 9. Involucral scales. Fig. 10. Ray-flower; enlarged four times. Fig. 11. Stigmas of the same; enlarged sixteen times. Fig. 12. Disk-flower; four times enlarged. Fig. 13. Achenium. Fig. 14. Corolla; expanded. Fig. 15. Anther; each enlarged eight diameters. Fig. 16. Style; enlarged sixteen diameters, but incorrectly drawn, and showing the stigmatic portion much too long, and the appendages too obtuse. The place for this plant is in *Pseuderigeron* with

*E. filifolium* and *E. ochroleucum*, which it resembles in habit, although the much imbricated involucre and the almost lanceolate appendages of the style show a very close approach to *Aster*. (547.)

ERIGERON CÆSPITOSUM, Nutt. "Dwarf, canescent with a close and short pubescence; stems numerous from a thickened caudex, cæspitose, decumbent, mostly simple and terminated by single heads; leaves linear-oblong, rather obtuse, entire, the cauline sessile, the radical clustered, oblanceolate or spatulate-oblong; rays white or rose-color, very numerous and somewhat in a double series, twice the length of the hirsute-tomentose involucre; achenia hairy; exterior pappus squamellate-subulate, very distinct." *T. & G.*—Saskatchewan to Southern Wyoming. Var. GRANDIFLORUM, T. & G. Taller, 8–10′ high; leaves linear-spatulate, the radical ones often 3–5′ long, 2–4″ wide; heads, when expanded, an inch broad.—British America, in the plains of the Rocky Mountains and the Saskatchewan; Colorado, (244 Hall & Harbour;) Mount Davidson and Cedar Hill, Nevada, (Bloomer.) West Humboldt and Pah-Ute Mountains, on the foot-hills; 5–6,000 feet elevation; June. (548.) Another form, like Hall and Harbour's plant, but with silvery-canescent foliage, was collected in Ruby Valley and near Robert's Station, Nevada; 6,000 feet elevation; July. (549.)

Another plant, possibly a dwarf form of this species, but at best of most uncertain diagnosis, was collected on Star Peak, at 9,000 feet altitude; September. It is the same as Brewer's 2043, referred by Dr. Gray, but very doubtfully, to *E. nanum*, Nutt. (550.)

GUTIERREZIA[1] EUTHAMIÆ, T. & G. Stems 6–15′ high, numerous from a woody and much-branched base, striated; leaves crowded, narrowly linear, 1–2′ long, ½–1″ wide, 1-nerved, minutely scabrous, punctate, resinous, and sometimes varnished; heads in little clusters forming compound corymbs; involucres scarcely 2″ long and 1″ broad, narrowly obovate; flowers of the

[1] GUTIERREZIA, LAGASCA. Heads small or middle-sized, 6–90-flowered, the rays pistillate, fertile, the disk-flowers tubular, perfect and fertile. Involucre varying from narrowly obconic to broadly hemispherical, the scales closely imbricated in several series, rigid, and with greenish herbaceous tips. Receptacle naked. Corollas yellow, of the ray oval, oblong or linear, of the disk funnel-shaped, 5-toothed, the teeth erect or recurved. Branches of the style in the ray-flower, linear, smooth, the stigmatic lines extending to the top; in the disk, with the hairy appendages shorter or several times longer than the stigmatic portion. Achenia oblong or obconic, terete or somewhat compressed. Pappus of the disk composed of several oblong or linear chaffy scales, or reduced to a lacerate coroniform border, of the ray similar to that of the disk, but commonly smaller or sometimes obsolete.—Mostly perennial and suffruticose plants of North and South America, with glabrous and often resinous-dotted or varnished linear and entire or broader and denticulate leaves.

ray 2–5, of the disk 3–6; pappus of 9–10 obtuse unequal erose-denticulate chaffy scales, a little shorter than the achenium.—Plant growing in dense tufts, when in flower forming a conspicuous yellow round-topped bushy clump. From the Saskatchewan, east of the mountains, to New Mexico and Chihuahua, and westward to California. Western Nevada, (Bloomer.) From the Virginia Mountains to the Wahsatch; 5–7,000 feet elevation; July–October. (551.)

SOLIDAGO VIRGA-AUREA, L., Var. MULTIRADIATA, T. & G. Stems villose-pubescent, especially towards the summit, mostly simple; leaves ciliate, oblong-lanceolate, the radical obovate and narrowed into a petiole; heads large, in a dense compound raceme or loosely corymbose; involucral scales ciliolate, acute; rays 8–18.—Labrador; Behring Strait and Mackenzie River to California and Colorado; Virginia City, (Bloomer.) Three forms were collected:—(*a.*) Plant 12–18′ high; heads loosely subcorymbose. (552.) (*b.*) Plant 8–15′ high; heads thyrsoid. (553.) (*c.*) Plant 2–3′ high; a dwarf high-alpine form of the last, identical with Brewer's Californian 1792, but not the eastern var. *alpina.* (554.) Uinta Mountains, about Bear River Cañon; 8,000 feet altitude; the last form on a peak 12,500 feet high; August.

SOLIDAGO STRICTA, Aiton. Hudson's Bay to Maine, Pennsylvania and Wisconsin. East Humboldt Mountains; 6,500 feet elevation; a single specimen, not yet in flower, the involucral scales rather broad, but the strict habit, glabrous purple stem, and narrow lanceolate leaves are sufficiently characteristic. August. (555.)

SOLIDAGO GUIRADONIS, Gray. *Proc. Amer. Acad.*, 6. 543. Smooth; stems slender, erect, 2½–3° high, from a woody rhizoma; lowest leaves lanceolate, 6′ long, 3–5″ broad, tapering into a margined petiole, the cauline ones narrowly linear, 2–3′ long, 1–3″ broad; panicle erect, not one-sided, very narrow and composed of few and rather small heads; involucral scales linear, acuminate, the midvein broad and prominent; rays 8–9, scarcely longer than the 10–12 flowers of the disk; achenia puberulent.—Base of San Carlos Mountain, California, along a creek; collected by Guirado, a native Californian in Prof. Brewer's party. Var. SPECTABILIS. Stems stout, 3–4° high; lower and radical leaves broadly oblanceolate, 8–12′ long, ½–1½′ wide, the petiole dilated at the base; the upper ones sessile, lanceolate; panicle oblong, densely many-flowered; heads rather large, involucral scales oblong-

linear, mostly obtuse; flowers of the ray 12-15, of the disk about 20. Stream-banks, mountains of Western Nevada to the East Humboldt Mountains; 5,500–7,000 feet elevation; August, September. A very showy plant, nearly intermediate between the true *S. Guiradonis* and *S. speciosa;* it has however the elongated leaves and the very short rays of the former, and the stem is moreover perfectly smooth, even to the smallest branchlets of the panicle. (556.)

SOLIDAGO PUMILA, T. & G. Cæspitose, glabrous and somewhat resinous; stems 4–9′ high, very many from a stout underground woody caudex; leaves crowded, narrowly lanceolate, strongly 3-nerved, very acute and somewhat mucronate; the radical 2–3′ long, 2–3″ wide, narrowed into a short petiole; heads sessile in little clusters which are arranged in a dense fastigiate corymb; involucres cylindrical-oblong, the closely imbricated scales carinate, ovate or oblong, obtuse, with scarious margins and appressed scarcely herbaceous tips, rather obtuse; rays 1–3; disk-flowers 3–4; achenia glabrous.—Colorado, (Vasey,) and New Mexico; "western declivity of the Rocky Mountains," (Nuttall.) Western Nevada, East Humboldt Mountains, and the Wahsatch; 5–6,500 feet elevation; May–August. (557.)

SOLIDAGO NEMORALIS, Ait. Saskatchewan and Canada; throughout the United States westward to Texas and New Mexico. Southeastern Idaho and in the Wahsatch; 6,000 feet elevation; July–October; forms with mostly entire, sparingly roughened, elliptical leaves, indicating a transition towards *S. Radula.* (558.) A form of this plant, with stems 8–12′ high, leaves more canescent, and the heads disposed somewhat corymbosely, makes a close approach to *S. nana.* Colorado, (248 Hall & Harbour.) Ruby Valley, Nevada, and Bear River Valley, Utah; 6,000 feet elevation; July. (559.)

SOLIDAGO ELONGATA, Nutt. Stem puberulent, becoming smoothish, 1–4° high, erect from a creeping rhizoma; leaves crowded, uniform, lanceolate, narrowed at both ends, acute, 3-nerved, veinlets reticulated, sparingly serrate, minutely scabrous on the margins and along the veins beneath; panicle one-sided, rather dense, elongated or pyramidal, with recurved branches; heads mostly rather small; involucral scales loosely imbricated, linear-subulate, without greenish tips; rays small and narrow, more numerous than the disk-flowers; achenia pubescent.—Arctic America to California and New Mexico. Virginia City, (Bloomer.) Var. *β.* T. & G. "Leaves lanceo-

late-linear, sharply and irregularly serrate; racemes strict, at length somewhat spreading, but scarcely secund; heads smaller." Ruby and Huntington Valleys and lower cañons of the East Humboldt Mountains; July–September. (560.)

SOLIDAGO GIGANTEA, Aiton. Saskatchewan to Oregon, and eastward from Canada to Alabama. Two forms were collected:—(*a.*) Leaves thin, smooth, distantly serrulate. On Poplar Creek, in the East Humboldt Mountains; 6,500 feet elevation. (561.) (*b.*) Leaves thickish, often somewhat scabrous above and on the veins beneath, broadly lanceolate, and the lower ones at least coarsely serrated. Stream banks throughout Nevada and in the Wahsatch; 4,500–6,000 feet elevation; July–October. (562.)

SOLIDAGO OCCIDENTALIS, T. & G. Smooth; stems 2–3° high, paniculately corymbose at the summit, leafy; leaves linear-lanceolate, obscurely 3–5-nerved, minutely scabrous on the edges, the larger ones 4′ long, 3″ broad; heads rather large, pedicellate in many small corymbs, broadly obconic; involucral scales loosely imbricated in about 3 series, oblong-linear, the straight tips greenish, ciliolate, rather acute; rays 15–25, very small; disk-flowers 10–15; achenia pubescent.—Oregon and California to the Rocky Mountains, (Nuttall.) Big Bend of the Truckee, and on Soda Lake in Carson Desert, Nevada; 4,500 feet elevation; August. Very near to *S. lanceolata* of the east, which extends as far west as Kansas, but the latter plant has the branches and leaves considerably scabrous-pubescent, the heads narrowly oblong-clavate, and the involucral scales somewhat resinous and closely appressed. 247 Hall & Harbour, from the Nebraska plains, seems to be *S. occidentalis* rather than *S. lanceolata*, though from its station one would look for the latter and not the former. (563.)

LINOSYRIS[1] GRAVEOLENS, T. & G. Shrubby, forming a dense bush, 1–4° high, with numerous virgate terete smooth and green, or puberulent-tomentose and whitish branches; leaves narrowly linear, 1-nerved, 1–2′ long, ½–1″ wide; heads large, 5-flowered, in little clusters which are either corym-

[1] LINOSYRIS, LOBEL. Heads 5–many-flowered, the (yellow) flowers all tubular and perfect. Involucre obconic or campanulate; the somewhat rigid and carinate scales imbricated in several series; the innermost elongated; the outer ones shorter and passing into the leaves. Receptacle alveolate-toothed; the teeth lacerate, or sometimes becoming cuspidate processes. Corollas slender, the expanding limb 5-cleft. Style with flattened branches; the stigmatic portion oblong or linear; the pubescent appendages lanceolate or often elongated. Achenia oblong, villous or pubescent. Pappus of copious unequal scabrous capillary bristles.—Perennial herbs or suffruticose plants, branched from the base and corymbose or sub-paniculate at the summit, often resinous and having a strong balsamic but unpleasant odor; leaves linear or lanceolate, sessile. Natives of Asia, Europe and Western North America.

bose or panicled; involucre oblong, 4″ long, 1″ wide, the scales few, carinate, glabrous, 5-ranked, imbricated in about 3 series, the outer ones very short, the innermost linear, half as long as the brilliant yellow flowers; appendages of the style linear-subulate, longer than the stigmatic portion; achenia hairy; pappus of very fine bristles, nearly as long as the corolla.—Plains of the Upper Platte and Colorado to California, Arizona and New Mexico; Mount Davidson, etc., (Bloomer.) Western Nevada to Salt Lake, often very abundant; 4,500–6,000 feet elevation; July–October. Inflorescence less corymbose and branches greener than in Bolander's 6143 from Mono Lake. (564.)

Var. β., T. & G. "Leaves and the outermost scales of the involucre, as well as the branches, more or less tomentose-pubescent."—Thousand Spring Valley, Nevada, and in the Wahsatch; 5,500–7,000 feet elevation. Heads in dense corymbs. (565.)

LINOSYRIS VISCIDIFLORA, T. & G. Shrubby, a dense bush, 1° high, (2–4°, *Hook.*;) older branches with a gray bark; younger ones smooth, slightly angled; leaves narrowly linear, 1-nerved, 8–12″ long, ¼–1″ wide, glabrous; heads small, 5–6-flowered, the clusters in dense flat corymbs; involucres 2½–3″ long, obconic, of loosely imbricated glabrous often resinous or glutinous oblong-linear obtuse scales, the outer ones very short; corolla at first scarcely exserted, but as the achenium grows it considerably exceeds the involucre; style as in the last; achenia hairy; pappus of rather rigid and scabrous setæ.—Washington Territory, Oregon, and California to Colorado. East Humboldt Mountains, and eastward in Nevada; 6,000–7,000 feet elevation; July–September. (566.) The above character is intended for the typical form only; several other forms occur in the collection.

Var. SERRULATA, Torr., in *Stansb. Rep., ed.* 2., *p.* 389. Leaves linear-oblong, nearly 2″ wide, 3-nerved, scabrous-ciliolate.—Valley of Great Salt Lake, (Stansbury;) California, (Brewer;) Western Nevada, (Bloomer;) Colorado, (49 Parry, 295 Hall & Harbour.) West Humboldt Mountains, and on a ridge at the mouth of American Fork Cañon, Wahsatch Mountains, Utah; 5,500 feet elevation. (567.)

Var. LATIFOLIA. Glabrous; leaves lanceolate-oblong, 12–18″ long, 3–5″ wide, 3-nerved or indistinctly 5-nerved, mucronulate; involucral scales acute; heads 5–7-flowered.—Possibly a distinct species, but Parry's 49 of the col-

lection of 1862 seems to connect it with Var. *serrulata.* Mountains at the head of Humboldt River; 6,500–7,000 feet elevation. (568.)

Var. PUBERULA. (*L. viscidiflora*, Var. $\gamma$., T. & G., in part.) Branchlets, leaves, especially the lower surface, and outer involucral scales minutely scabrous-pubescent; leaves narrow, 1–3-nerved.—California, and Western Nevada (Bloomer) to the Rocky Mountains. Near the Truckee and on the Hot Spring Mountains in Western Nevada, and in Bear River Cañon, Uintas; 4,500–8,000 feet elevation. (569.)

LINOSYRIS HOWARDII, Parry. *Proc. Amer. Acad.*, 6. 541. "Shrubby, 6–18′ high; younger branches white-woolly; leaves linear, one-nerved, from webby becoming smooth, the uppermost about as long as, or exceeding, the corymbose and crowded heads; involucre cylindrical, 5-flowered, the scales rather loose, all of them finely acuminate; tube of the pale-yellow corolla sparingly villous; achenia linear, pubescent." *Gray.*—Colorado, (Parry.) Var. NEVADENSIS, Gray. *Proc. Amer. Acad.*, 6. 541. "Leaves rather wider and broader, the apex cuspidate and mostly incurved; lower ones sub-spatulate-linear; involucral scales more webby, especially along the margins, and somewhat viscid." *Gray.*—California, (Brewer,) and Western Nevada, (Bloomer, Anderson.) West Humboldt Mountains; 8,000 feet elevation; September. Plant a dense bush, about 2° high. (570.)

APLOPAPPUS[1] BLOOMERI, Gray. *Proc. Amer. Acad.*, 6. 541. Shrubby, about 1° high; branches and leaves smooth; the latter narrow linear-spatulate, about 1′ long and 2″ broad, narrowed at the base, slightly apiculate, 1-nerved or indistinctly 3-nerved, the uppermost passing into the involucral scales; heads in dense sub-paniculate clusters; involucres campanulate, about 5″ long, the scales loosely imbricated in 3–5 series, lanceolate, rigidly chartaceous with scarious ciliated margins, and the outer ones with long-

[1] APLOPAPPUS, CASS. (*Macronema*, *Ericameria*, *Stenotus*, *Isopappus*, *Aplopappus*, *Pyrrocoma* and *Prionopsis* of Torrey and Gray's *Flora*.) Heads few-many-flowered; ray-flowers 3-many, pistillate, fertile; those of the disk tubular, perfect, generally fertile. Involucre cylindrical, turbinate, campanulate or hemispherical; the scales imbricated in few-several series, from linear-subulate varying to broadly oval, with or without foliaceous tips; the outer ones sometimes smallest, sometimes very large and leaf-like. Receptacle flat, alveolate. Corolla of the disk funnel-shaped, or slightly dilated upwards, 5-toothed. Style of the disk-flowers with the branches flattened, sometimes broadly lanceolate, but more frequently much elongated, the subulate hispid appendages much longer than the stigmatic portion. Achenia oblong or linear, mostly terete or turbinate, villous or pubescent, rarely glabrous. Pappus simple, white or brownish, of copious mostly unequal scabrous somewhat rigid or soft capillary bristles.—Perennial herbs or suffruticose plants, with entire or pinnately toothed or serrate leaves; the heads often large and solitary, but sometimes smaller and corymbose or somewhat panicled. Native of Western North America and parts of South America; the flowers always yellow, but showing great diversity in the size of the heads and in the rays, styles, pappus, etc. The few rayless species are not easily separated from *Linosyris*.

acuminate foliaceous tips; rays 3–4, oblong; disk-flowers 15–20, their styles with very long linear-lanceolate hispid appendages; achenia appressed hairy; pappus of soft slightly fulvous capillary bristles.—Plant with much the look of a *Linosyris*, and, indeed, the var. *angustatus*, Gray, (*l. c.*, 7. 354,) has some of its heads quite rayless. Mount Davidson (Bloomer!;) near Carson City, (Anderson;) the variety, California, (Brewer, etc.)

APLOPAPPUS NANUS. (*Ericameria nana*, Nutt.) A low branching heath-like shrub, 3–8′ high, glabrous and somewhat glutinous; leaves crowded, 3–6″ long, linear-spatulate, rigid, channeled, acute, and with minute leaves fascicled in their axils; heads small, corymbed; involucre turbinate, of numerous lanceolate carinate chartaceous scales, with scarious margins, very acute; the outer ones small and passing into the leaves; rays 4–6; disk-flowers 8–9, as long as the rays; branches of the style (in the disk-flowers) linear-subulate, the hirsute appendages much longer than the stigmatic portion.—Blue Mountains of Oregon, (Nuttall.) On rocky ridges, East and West Humboldt Mountains, and in Thousand Spring Valley, Nevada; 6–7,000 feet elevation; August, September. (571.)

APLOPAPPUS SUFFRUTICOSUS, Gray. *Proc. Amer. Acad.*, 6. 542. (*Macronema suffruticosus*, Nutt.) A span high, from a stout woody base; stems many, slender, green, and like the leaves glandular-puberulent, leafy to the summit; leaves 8–10″ long, 2″ broad, obovate-spatulate, entire, 1-nerved, slightly apiculate; heads solitary or several in the terminal corymb; involucre turbinate; the linear-lanceolate scales lax, sub-equal, acute; outer ones wholly or partly herbaceous; inner ones chartaceous, with scarious lacerate-ciliate margins; rays 3–10, at first twice as long as the disk; disk-flowers about 30; style much as in the next; achenia linear, pubescent.—Blue Mountains of Oregon, (Nuttall;) California, (Brewer!) East and West Humboldt Mountains; 6–7,000 feet altitude; August, September. (572.)

APLOPAPPUS MACRONEMA, Gray, *l. c.* (*Macronema discoidea*, Nutt.) A span high from a slender, branching, woody base; the terete stems white-tomentose; leaves linear-oblong, obtuse or apiculate, 8–12″ long, 2-3″ wide, obscurely 3-nerved, minutely glandular and scabrous; heads single or few in a corymb, turbinate; scales few, sub-equal, broadly lanceolate, glandular; the outer ones herbaceous, at least in part; rays none; disk-flowers about 25; branches of the style very long, filiform, much exserted, the hispid part twice

as long as the stigmatic; achenia pubescent.—Oregon to California; Colorado. East Humboldt Mountains, on a peak of 10,000 feet altitude; August. (573.)

Aplopappus lanceolatus, T. & G. Glabrous or at first slightly lanuginous; stems 6–12′ long, ascending from a deep fusiform caudex, corymbosely branched towards the summit, and often with one or two longer branches from below the middle; leaves rather rigid; the radical lanceolate, 3–5′ long, 4–6″ wide, narrowed into short petioles, sinuate-dentate or serrate; upper ones oblong, entire or serrate, the base dilated and clasping; heads 2–10, 9″ wide when expanded; involucre turbinate-hemispherical, the sparingly imbricated sub-equal scales lanceolate-oblong, slightly ciliate, greenish towards the tip; rays 16–25, yellow; disk-flowers numerous; appendages of the style lanceolate, about equal to the stigmatic portion; achenia villous; pappus of unequal brownish-white scabrous capillary bristles.—Saskatchewan to Oregon, Southern Wyoming and Nebraska. Clayey and alkaline meadows in Northern Nevada; 5–6,000 feet elevation; June–August. (574.)

Var. Vaseyi, Parry, Ms., is more condensed, and with a stouter caudex; heads 3–12, rather large; the scales of the involucre broader, with well-developed herbaceous tips, very unequal, and imbricated in several rows; rays deep saffron-yellow.—Colorado, (273 Vasey.) Parley's Park, Utah, in a muddy saline flat; 6,000 feet elevation; July. The Utah specimens have a less imbricated involucre than those from Colorado, and show the necessity of uniting Vasey's plant with the older species. (575.)

Aplopappus tenuicaulis. Silky-tomentose, or at length nearly glabrous; stems 6–15′ long, very slender, curved and ascending from a fusiform caudex; leaves all narrowly lanceolate, rather rigid; the radical 2–3′ long, 2–3″ wide, entire or sparingly denticulate, narrowed into a very short petiole; cauline ones sessile by a dilated base; heads small, 2–6, racemose on slender peduncles; involucre hemispherical, the broadly oblong scales tomentose on the back, and rather obtuse; rays about 20, yellow; disk-flowers numerous; hispid appendages of the style linear-lanceolate, twice as long as the stigmatic portion; achenia silky-villous; pappus white, of unequal almost plumulose capillary bristles.—Alkaline meadow in Ruby Valley, Nevada; 6,000 feet elevation; August. Near to *A. lanceolatus*, but sufficiently distinguished from it by the narrower and at first white-tomentose leaves, the very slender stems, racemosely rather than corymbosely branched, and the smaller heads, with different involucral scales. (576.)

APLOPAPPUS UNIFLORUS, T. & G. Loosely webby-pubescent, or at length smooth; stems several, 12–18′ high, ascending from a fusiform caudex; radical leaves broadly-lanceolate, 4–6′ long, 6–15″ wide, tapering both ways, on moderately long petioles, coarsely and sharply serrate; cauline ones gradually smaller, oblong-linear, serrate or entire; heads large, solitary or 2–5 on very long nearly or quite naked peduncles; involucre flattened hemispherical, 9–12″ broad, the nearly equal oblong-linear scales in one or somewhat in two rows, slightly hairy; rays deep-yellow, about 50; disk-flowers numerous; the style with oblong-lanceolate branches, the hispid and the stigmatic parts nearly equal; achenium silky-villous; pappus whitish, of rather few, somewhat unequal, scabrous, capillary bristles.—"Plains of the Saskatchewan and prairies of the Rocky Mountains, (Drummond.") Near the tunnels of Echo Cañon, and near Evanston, on the Bear River, Utah; 6–7,000 feet elevation; July. The plant described by Hooker, under the name of *Donia uniflora*, was of lower stature, and had usually but one head, and that with fewer and rather longer rays. (577.)

APLOPAPPUS ACAULIS, Gray. *Proc. Amer. Acad.*, 7. 353. (*Stenotus acaulis*, Nutt.) Low, cæspitose; stems leafy at the base, 2–6′ high, clustered at the summit of a woody caudex; leaves minutely scabrous-pubescent; the lower ones oblanceolate, mucronate-acute, somewhat 8-nerved, about 1′ long; upper ones none, or few and very small; heads single, 12–14″ broad; involucre hemispherical, nearly glabrous, of few broadly ovate, acute, chartaceous, scarious-margined, imbricated scales; rays 10–12, very broad; style of the disk-flowers with linear-lanceolate hispid appendages, nearly twice longer but narrower than the stigmatic portion; pappus copious, whitish, of unequal densely scabrous somewhat rigid bristles.—Southern Idaho; Mount Davidson, Nevada, (Bloomer!) Mountain ranges of Nevada from the Trinity to the East Humboldt Mountains; 6–8,000 feet altitude; May–July. (578.)

VAR. GLABRATUS. (*Stenotus cæspitosus*, Nutt.!) Smooth; the scapes more leafy, sometimes branching and bearing 2–3 heads; not otherwise differing from the type.—Idaho or Wyoming, (Wyeth;) Valley of Great Salt Lake, (Stansbury.) East Humboldt Mountains, and above Cottonwood Lake in the Wahsatch; 7,500–9,500 feet altitude; July–September. (579.)

APLOPAPPUS APARGIOIDES, Gray. *Proc. Amer. Acad.*, 7. 354. Low, cæspitose, smooth or sparingly villose-ciliate; stems numerous, 3–7′ high,

ascending or erect from a fusiform caudex; radical leaves 2–3′ long, lanceolate or linear, acuminate, narrowed into a petiole, laciniately pinnatifid; cauline ones smaller, toothed, the uppermost entire and bractlike; heads solitary or with 1–2 lower ones on short peduncles, 8–12″ broad; involucres hemispherical, of many oblong, rather obtuse, herbaceous-tipped scales, imbricated in several rows; rays 18-24; style of the disk-flowers with very hispid lanceolate appendages nearly twice longer than the stigmatic portion; achenia striate, glabrous; pappus tawny-white, copious, of unequal scabrous bristles, some of the longer ones slightly clavate.—With much of the habit of *A. lanceolatus* this species has the achenia and pappus of the section *Pyrrocoma*, to which Dr. Gray has referred it. California, (Bolander;) Carson City, Nevada, (Anderson.)

Aplopappus paniculatus, Gray, *l. c.* (*Pyrrocoma paniculata*, T. & G.) Glabrous; stems several, 1° high, nearly erect from a fusiform caudex; radical leaves petioled, oblong-lanceolate, mucronate, obscurely serrulate, 3–5, long; the cauline ones lanceolate from a broad clasping base; heads several, rather large, sessile in the axils of bracteal leaves; involucres campanulate, of many oblong-ovate herbaceous-tipped scales, closely imbricated in several rows; rays 10–12, slender; style of the disk-flowers with subulate hispid appendages, twice longer but narrower than the stigmatic portion; achenia flattened, nearly glabrous; pappus tawny-white, of nearly equal scabrous fragile capillary bristles.—Oregon, (Nuttall.) Var. virgatus, Gray, *l. c.* Heads more numerous and smaller; leaves narrowly lanceolate, glaucous, entire.—California, (Bolander;) Carson City, Nevada, (Anderson.)

A plant much like this species, but of lower stature and with the heads somewhat corymbose on slender peduncles and with very tawny pappus, was collected near Virginia City by Bloomer.

Aplopappus Parryi, Gray. *Sill. Jour.*, (*n. s.*,) 33. 10. Stems erect, 6–18′ high, viscidly puberulent towards the summit, leafy, corymbosely branched above; leaves nearly glabrous; the lower ones oblong-obovate, obtuse, entire, narrowed into a petiole; the upper ones sessile, oblong-ovate or oblanceolate; heads few or many, nearly sessile in corymbed clusters; involucres 4–6″ broad, campanulate; the oblong obtuse scales imbricated in several rows, chartaceous, the outer ones more foliaceous; rays 12–20, small and narrow, pale-yellow; disk-flowers numerous; appendages of the style lanceolate, slightly hispid, rather longer than the stigmatic portion; achenia

glabrous, or with a few scattered hairs; pappus copious, white, of unequal scabrous capillary bristles.—Colorado, (Parry, Hall & Harbour, 268 Vasey.) Parley's Park in the Wahsatch, and in Bear River Cañon, Uinta Mountains; 6–10,000 feet altitude; July, August. (580.)

Aplopappus Nuttallii, T. & G. Torrey, *Sitgreave's Rep.*, *p.* 162, *t.* 21. Canescent with a fine pubescence; stems numerous, a span high from a branching woody base, leafy; leaves obovate-cuneate, about 1′ long, 2″ wide, pinnately toothed, the teeth elegantly bristle-tipped; heads few, in terminal corymbs; involucres campanulate, 4–6″ broad; the scales imbricated in several rows, oblong or linear, rigidly chartaceous with scarious margins, the greenish tips abruptly contracted and spreading; rays none; disk-flowers about 25; styles with very hispid triangular-lanceolate appendages, scarcely longer than the stigmatic portion; achenia turbinate, silky-villous; pappus white, of copious very unequal scabrous rigid bristles.—Saskatchewan to Oregon and Idaho, and southward to New Mexico. Wahsatch Mountains, in Weber Valley; 6,000 feet elevation; July. (581.)

Aplopappus sphærocephalus, Harv. & Gray. *Pl. Fendl.*, *p.* 76. *Pac. R. R. Surv.*, 7. 12, *t.* 6. Shrubby, glabrous, 1–2° high; branchlets slightly wing-angled; leaves alternate, sessile, 6-9″ long, narrowly linear-spatulate, 1-nerved, entire, mucronulate; heads terminal, solitary or in simple corymbs, large, 5–9″ wide; involucre hemispherical; the obtuse scales imbricated in several rows, their margins scarious and lacerate-ciliate; flowers 30–40, all tubular; achenia top-shaped, densely villous-lanate; pappus short, of 20 or more bristles, spatulate-clavellate towards the tip, plumulose below, a few shorter subulate ones intermixed.—A very interesting plant, for which a separate sub-genus, *Acamptopappus*, was provided, (*Pl. Fendl.*, *l. c.*;) but the pappus is so very peculiar that it might well be made the type of a distinct genus. California, (Coulter;) San Felipe, New Mexico, (Park's Expl.;) St. George, Southern Utah, (Dr. E. Palmer, 1870.)

Grindelia[1] squarrosa, Dunal. Glabrous and viscidly resinous; stems herbaceous from a perennial caudex, 12–20′ high, corymbosely branched

[1] Grindelia, Willd. Heads many-flowered; the ray-flowers generally present, pistillate, the ligule elongated; disk-flowers perfect, the corolla tubular-funnel-shaped, 5-toothed. Involucre subglobose or hemispherical, the scales imbricated in many rows, often with squarrose tips. Receptacle naked, flat, foveolate. Style with lanceolate hispid appendages as long as the stigmatic portion. Achenium smooth, oblong or ovate, somewhat angled. Pappus of 2–8 smooth rigid deciduous awns, shorter than the disk-corollas.—Biennial (?,) perennial or suffruticose, often resiniferous, Mexican and North American plants. Leaves entire or serrate, often punctate, the cauline ones sessile. Heads corymbed at the ends of the branches, or solitary, mostly rather large.

above; leaves somewhat rigid, glaucous and punctate-reticulated; the radical ones spatulate-lanceolate, narrowed into a petiole, dentate or incised; the cauline mostly oblong, sessile and partly clasping, finely toothed or spinulose-serrate; heads numerous; involucres sub-globose, 6″ broad; the scales very rigid, closely appressed, but with very long reflexed or squarrose subulate points; rays numerous, rather narrow; pappus of 2–4 very rigid deciduous bristles or awns.—Arctic America to Nebraska, California, New Mexico and Texas. Wahsatch Mountains and Salt Lake Valley; 4,500–7,000 feet elevation; August. (582.)

Var. GRANDIFLORA, Gray. *Pl. Wright.*, 1. 98. Heads much larger; achenia somewhat four-sided, compressed. California and New Mexico. Ruby Valley, Nevada; 6,000 feet elevation; September. The same as Frémont's plant. (583.)

CHRYSOPSIS VILLOSA, Nutt. Saskatchewan to Oregon and California, and eastward to Illinois, Kentucky and Texas. A most variable species, to which are referred *C. canescens* and *echinoides*, besides the following.—Var. HISPIDA, Gray. *Proc. Acad. Philad., Mar.* 1863, *p.* 65. (*C. hispida*, DC.) Hispid with rigid whitish hairs, and exceedingly scabrous; leaves rigid, smaller, and very narrow.—Nearly the same form as Lindheimer's 631, but with fewer long spreading hairs, and the leaves are acutely lanceolate. Mouth of Cottonwood Cañon, Utah; 5,000 feet elevation; July. (584.)

Another form of this variety, with scarcely any spreading hairs, the whole plant copiously resinous-glandular, was found at Frémont's Pass in the East Humboldt Mountains, and at the City of Rocks in Southeastern Idaho; 6–6,500 feet elevation; August–October. (585.)

Var. FOLIOSA. (*C. foliosa*, Nutt.) Stem hirsute with soft spreading white hairs, very leafy; leaves obovate-oblong, 15–20″ long, 4″ broad, softly canescent and silky-villous, the lower part somewhat hirsute like the stem; heads in a large open corymb; involucre of linear-subulate canescent scales. Scarcely distinguishable from *C. canescens*, but whiter and more silky than *C. villosa*. Salt Lake Valley, and along the western foot of the Wahsatch; 4,500–5,000 feet elevation; July, August. (586.)

LAPHAMIA[1] STANSBURII, Gray. *Pl. Wright.*, 1. 101. Torrey, *Stansb. Rep.*, (*ed.* 2,) *p.* 389, *t.* 7. Puberulent; stems 6–12′ high, many from a stout

[1] LAPHAMIA, GRAY. *Pl. Wright.* 1. 99. Head several-many-flowered; rays few, pistillate, fertile, the ligule oval or oblong, 2–3-toothed, scarcely exceeding the disk, sometimes none; disk-flowers perfect,

woody caudex; leaves petioled, opposite and alternate, roundish or broadly ovate, 2–4″ wide, few-toothed or nearly entire; heads solitary at the ends of nearly naked branches; involucres 3″ wide, the appressed scales obovate-oblong; rays 6–10, the oblong ligules much longer than the tube and slightly exceeding the disk, 2-toothed at the apex; disk-flowers about 25; pappus of a single bristle a little shorter than the disk-corolla.—The branches of the style appear to be somewhat semi-cylindric rather than flattened. Crevices of limestone rocks on Stansbury Island, (Capt. Stansbury.) On the same island, upon rocks; 4,500–5,000 feet elevation; June. (587.)

Iva axillaris, Pursh. Stems 6–15′ high, much branched from a somewhat woody slender base, very leafy; leaves small, 9–12″ long, 3–6″ wide, obovate or oblong, obtuse, narrowed at the base, minutely appressed-pubescent; heads solitary in the axils of the upper leaves, nodding on short peduncles; involucres of few concave orbicular foliaceous scales, either distinct or partially united; fertile flowers 4–5; chaff of the receptacle filiform-clavellate.—Saskatchewan to Oregon and California, and eastward to Nebraska; about Virginia City, Nevada, (Bloomer.) Abundant in the Valleys, from the Truckee River to the Wahsatch; 4–6,000 feet elevation; June–September. (588.)

Ambrosia artemisiæfolia, L. North America from the Atlantic to the Pacific, northward to the Saskatchewan and southward to Texas. Humboldt Pass, Nevada; 6,000 feet elevation; September. (589.)

Ambrosia psilostachya, DC. (*A. coronopifolia*, T. & G.) Illinois to California, and southward to Texas; Salt Lake Valley, (Stansbury.) Jordan Valley; 4,500 feet elevation; August. (590.)

Franseria[1] Hookeriana, Nutt. Annual, much branched, 1–2° high;

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the corolla tubular, more or less enlarged at the throat, with four ovate spreading teeth. Scales of the involucre in one or two series, oblong, membranaceous, keeled, one-nerved, the apex ciliate. Receptacle naked, flat, foveolate. Anther-cells somewhat produced at the base. Style of the disk-flowers with narrow flattened branches produced into a subulate hispid appendage. Achenia oblong, flattened, with a single nerve at each margin. Pappus either none or of a single stout scabrous bristle, rather longer than the achenium, or (in a doubtful species) of about 20 such bristles.—Low perennials, with many stems rising from a stout woody caudex; the leaves opposite or alternate, small, toothed or multifid, punctate or dotted with resinous globules; heads solitary or in terminal corymbs, the flowers yellow. Natives of Utah, New Mexico and Texas, or extending into Mexico.

[1] FRANSERIA, Cavanilles. Heads of two sorts, the fertile ones at the base, and the sterile ones composing the upper portion of the racemes or spikes. Fertile heads with an ovoid or oblong closed involucre composed of numerous united scales, the tips free and spinescent or hooked; corolla none or rudimentary; style with filiform obtuse branches; achenia oblong; pappus none. Sterile heads hemispherical, the 12–20-flowered cup-shaped involucre of 8–12 united scales; receptacle flattish, with filiform chaff; corolla funnel-shaped, 4–5-toothed; anthers tipped with a slender inflexed appendage; ovary none; style radiate-penicillate at summit.– Herbs or suffrutescent plants; the leaves alternate, coarsely toothed or lobed, or even bipinnatifid. Natives of America, from the Saskatchewan to Peru.

leaves ovate in outline, 1–1½′ long, minutely strigose, bipinnatifid, the segments oblong or linear; heads in panicled racemes; fertile ones with several strong flattened prickles; sterile ones with a 5–8-cleft involucre and 10–20 flowers; chaff of the sterile receptacle small and inconspicuous.—An unsightly weed. Saskatchewan to California, and eastward to Colorado and New Mexico; Steamboat Springs, Nevada, (Bloomer.) From the Sierras to Great Salt Lake; 4–6,000 feet elevation; August–October. (591.)

HYMENOCLEA[1] MONOGYRA, T. & G. *Pl. Fendl., p.* 79. Leaves 1–2′ long, entire or with a few distant divisions, the divisions, like the leaves, filiform; fertile involucres turbinate-fusiform, bearing near the middle a single whorl of broadly obovate scales; the apex tubular and moderately elongated.—Plant 2–5° high, having the look of an *Artemisia;* the ripened fruit silvery-scarious. California to New Mexico and Sonora. Foot-hills of Virginia Mountains, near the Truckee River; 4,500 feet altitude; May. (592.)

XANTHIUM STRUMARIUM, L., Var. ECHINATUM, Gray. *Manual, ed.* 5, *p.* 252. Atlantic coast, and along the Great Lakes; New Mexico and California. Truckee bottom, Nevada, and Promontory range, Utah; 4,500–5,500 feet elevation; July–October. (593.)

WYETHIA[2] AMPLEXICAULIS, Nutt. Smooth throughout and glutinous or resinous; stems 1–2° high from a stout but scarcely woody root, leafy, usually bearing 3–5 heads; leaves broadly oblong-lanceolate, entire or serrulate; the radical ones often 1° long and 2–3′ broad, petioled; the cauline successively smaller, sessile, often somewhat clasping; involucre 9–15″ broad, the glabrous subequal scales as long as the disk, the outer ones oblong,

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[1] HYMENOCLEA, T. & G., *l. c.* Heads of two sorts, clustered in the axils of the upper leaves, the fertile ones below the sterile. Fertile heads with an obovoid closed coriaceous one-celled and one-flowered involucre, which when mature has the sides winged with a circle or spiral of broad scarious appendages, representing the dilated tips of the involucral scales, the apex of the involucre conical, tubular, pointed. Sterile heads 5–6-lobed, 15–20-flowered; the receptacle small, bearing small obovate or spatulate clawed scarious chaff, nearly as long as the funnel-shaped or goblet-shaped 5-toothed corolla; anthers with a small inflexed deltoid appendage.—Glabrous much-branched shrubby plants, with alternate filiform leaves, or the lower ones pinnately 3–5-divided. Genus of two species only, natives of California, Nevada, Arizona, New Mexico, &c.

[2] WYETHIA, NUTT. Heads many-flowered, radiate; the rays very large, pistillate, fertile; disk-flowers numerous, tubular, ampliated near the base, five-toothed. Scales of the campanulate involucre imbricated in 2–3 series, subequal, the outer ones equaling or exceeding the disk, foliaceous, the inner ones narrow and rigid. Receptacle slightly convex, the lanceolate acuminate carinate chartaceous chaff as long as the disk-flowers and slightly inclosing them. Branches of the style of the disk-flowers linear-elongated, recurved, hispid, of the ray glabrous. Achenia elongated, flattened, somewhat 4–5-angled and prismatic, mostly smooth. Pappus coroniform, rigid, the teeth short and erose or denticulated, one or more of them often produced into awns.—Coarse perennial herbs, often resinous or balsamic, with ample nearly entire leaves, and large sunflower-like yellow heads, either solitary and terminal, or few on axillary peduncles; natives of North America from Oregon to New Mexico.

rather obtuse, foliaceous, the inner lanceolate, acute; rays about 15, nearly 2′ long, 3–5″ wide; pappus unequally 3–8-toothed, one or two teeth often awned.—A coarse, rank-smelling plant; the root somewhat fleshy, and said to be eaten by the Indians. Rocky Mountains of Washington Territory, to Colorado, (Parry.) Havallah range to the Wahsatch, in rich soil on the hill sides, abundant; 4,500–8,000 feet elevation; June, July. (594.)

WYETHIA MOLLIS, Gray. *Proc. Amer. Acad.* 6. 544. Woolly-tomentose, becoming smoothish; stems 1–2° high, bearing 1–3 heads; leaves entire, broadly oblong or oval, the uppermost ovate and sessile, lower cauline and radical petioled, very large, 9–12′ long, 3–5′ broad; involucre 1′ broad, white-woolly, the outer scales oblong-ovate, slightly exceeding the disk; rays 10–12, 12–15″ long, 3–4″ broad; achenia pubescent, linear; pappus with 2–3 long stout awns.—California, (Brewer! and Bolander!;) Carson City, Nevada, (Anderson!;) Mount Davidson, (Bloomer!)

BALSAMORRHIZA[1] HOOKERI, Nutt. Canescent or somewhat silky with soft short appressed hairs; radical leaves ovate-lanceolate in outline, 2–3-pinnatifid with narrow segments; scapes several, 6–10′ high, with a pair of entire or pinnatifid bracts near the base; heads solitary, 2–2½′ broad; involucral scales very numerous, lanceolate, acute; rays 12–18, 2–4-toothed at the end.—Plains of Washington Territory and Oregon; near Carson City, (Anderson, Bloomer.) Foot-hills of the Virginia and Trinity Mountains, Nevada; 5–6,500 feet elevation; April, May. (595.)

BALSAMORRHIZA HIRSUTA, Nutt. Scabrous-hirsute; radical leaves 8–10′ long, on petioles half as long and white-woolly at the dilated base, oblong-lanceolate in outline, pinnately cleft into numerous oblong-lanceolate or somewhat cuneate and incised segments; scapes about 1° high, monocephalous, bearing near the base a pair of nearly or quite entire petioled linear-lanceolate bracts; heads scarcely 2′ broad; scales of the involucre lanceolate; chaff of the receptacle much shorter than the flowers.—Oregon, and in the

[1] BALSAMORRHIZA, HOOK. Heads many-flowered, radiate; the rays large, pistillate, fertile; disk-flowers numerous, perfect, tubular, 5-toothed. Scales of the campanulate involucre imbricated in 3–4 or more rows, the outer foliaceous, as long as the disk, inner ones more rigid and passing into the rigid and acute concave chaff of the nearly flat receptacle. Branches of the style of the disk-flowers elongated, filiform, very hispid, of the ray one-half smaller, and nearly or quite smooth. Achenia oblong, quadrangular and striated, or those of the ray flattened; pappus none.—Coarse perennial herbs, with very large roots full of a balsamic resin, ample entire or pinnately lobed radical leaves, and stems 6′–2° high, bearing 1–3 sunflower-like heads and a few small leaves or bracts. Natives of Western North America. In this genus and in the last, the rays often produce two or three abortive stamens; the same thing occurs in many other genera.

Grand Ronde prairie, (Nuttall ! ;) Utah Valley, (Mrs. Carrington.) Summit of ridge on Antelope Island, Great Salt Lake, and on the ridge between Utah Valley and the Valley of Salt Lake ; 5,500–6,000 feet elevation ; June, July. (596.)

Balsamorrhiza macrophylla, Nutt. Sparingly pubescent and slightly glandular-roughened, at length nearly smooth ; radical leaves 6–10′ long, broadly ovate, long-petioled, pinnately parted ; the divisions oblong-ovate or broadly lanceolate, often 1′ wide, entire or more or less incised ; scapes 15–20′ high, monocephalous, with a pair of petioled pinnately-lobed leaves near the base ; heads very large ; involucral scales in about 3 series, lanceolate, the outer ones foliaceous and often reflexed ; rays 2′ long and often 6–8″ broad, the ends entire or slightly toothed.—"Toward the sources of the Colorado of the West, in the Rocky Mountains," (Nuttall ;) California. Abundant in the Wahsatch Mountains at 4,500–6,000 feet elevation ; May–July. The leaves vary in shape exceedingly, being sometimes slightly lobed, and occasionally even entire. (597.)

Balsamorrhiza sagittata, Nutt. Canescent and minutely tomentose ; radical leaves on long petioles, cordate-ovate or somewhat hastate, acute, entire, 4–8′ long, 2–4′ wide ; stems 9–15′ high, bearing a few small scattered oblong-spatulate leaves, monocephalous, or with 2–3 heads ; involucre white-woolly ; rays very large, entire or toothed.—Mountains of Oregon and California to Colorado ; Western Nevada, (Anderson ! Bloomer !) Foot-hills and mountain sides from Carson City to the Wahsatch ; 4,500–7,000 feet elevation ; April–July. (598.)

Rudbeckia occidentalis, Nutt. Smooth or nearly so ; stems 2–4° high, simple ; leaves ovate-acuminate, entire or coarsely toothed, ample, 5–7′ long, 3–4′ broad, 3–5 nerved at the base, and abruptly narrowed into a short winged petiole ; heads solitary or few, on long peduncles ; the involucre 1–2′ broad, of numerous oblong-linear unequal foliaceous spreading or reflexed scales ; rays none ; receptacle much elongated ; disk purplish-brown, conical-oblong, in fruit as thick as one's finger and half as long ; chaff about the length of the mature achenia ; pappus coroniform, toothed.—Oregon, and Rocky Mountains. East Humboldt Mountains to the Wahsatch ; 6–7,500 feet elevation ; July–September. (599.)

Helianthus exilis, Gray. *Proc. Amer. Acad.* 6. 545. Annual, scabrous or hirsute ; stems slender, a foot or more high, branching ; leaves oppo-

site and alternate, petioled, 12–18″ long, oblong-linear or elliptical, entire, 3-nerved at the base; heads numerous on long and very slender peduncles, very small, scarcely 1′ broad; involucre of 10–12 ovate-acuminate foliaceous scales, half as long as the 5–8 broad but very short rays; chaff of the receptacle tricuspidate, with the middle point becoming a stout awn; achenia glabrous or hirsute; scales of the pappus ovate-lanceolate.—California, (Bolander!) Carson Desert, near Soda Lake; 4,000 feet elevation; July. (600.)

HELIANTHUS LENTICULARIS, Douglas. Annual, scabrous and even hispid; stems purple-spotted, stout, 3–8° high, branching; leaves alternate, ovate, acuminate, coarsely serrate, 3–6′ long, 2–4′ broad, 3-nerved at the base and suddenly narrowed into a petiole nearly as long as the leaf; uppermost leaves more lanceolate; heads mostly panicled, peduncled, 2½–4′ broad; involucre spreading; the numerous ovate ciliate abruptly acuminate scales imbricated in about 3 rows, outer ones shortest; rays 20–24, large; chaff of the flat receptacle nearly as long as the purplish disk-flowers, concave, carinate, tricuspidate, the middle point much the strongest and dark-colored; achenia finely appressed-pubescent; pappus of two lanceolate chaffy awns.—Saskatchewan to Oregon, California, and Arizona, and eastward from the Upper Missouri to Texas and New Mexico. Common in the valleys throughout Nevada, and in Salt Lake Valley; 4–6,000 feet elevation; July–October. (601.)

HELIANTHUS NUTALLII, T. & G. Perennial; stem smooth, 3–4° high; leaves opposite, or all but the lower ones alternate, short-petioled, the upper sessile, all narrow linear-lanceolate, 4–6′ long, 3–6″ or even 12″ wide, entire or distantly serrate, 3-nerved near the base, scabrous on both sides; heads 1–7, about 2′ broad; involucre of lanceolate-subulate scales, hirsute toward the base; rays 20–24, rather narrow, deep-yellow; achenia glabrous; pappus of 2 lanceolate chaffy scales.—Plains of the Snake River, (Nuttall;) Rocky Mountains of Southern Idaho, (Burke.) Unionville, Upper Humboldt, and Ruby Valleys; 4–6,000 feet elevation; August–October. (602.)

HELIANTHUS GIGANTEUS, L. Saskatchewan and Canada to Georgia. Var. UTAHENSIS. Stem slightly hirsute, at length smooth; leaves narrower and thinner than in *H. giganteus*, minutely scabrous above, appressed-pubescent beneath, all but the uppermost opposite, narrowed into a short winged petiole; heads, &c., as in *H. giganteus.*—Parley's Park, Utah; 6,000 feet elevation; July. (603.)

HELIANTHELLA UNIFLORA, T. & G. Pubescent with short appressed hairs, and somewhat hirsute along the stem; leaves broadly lanceolate, 4–6 long, 1–2′ wide pointed, narrowed at the base, mostly opposite, the lower ones petioled, all 3-nerved above the base, heads solitary or with 1–2 from the upper axils, 2–4′ broad; involucre ciliate-hirsute, the scales lanceolate, foliaceous, the outer ones often exceeding even the rays; chaff of the slightly convex receptacle closely conduplicate, 5–7″ long, delicately scarious, pubescent at the tip; achenia 2-winged, ciliate and pubescent, crowned with 2 long awns and about 4 intermediate lacerate squamellæ.—Stems 2–3° high, usually single from a rather slender perennial caudex; rays pale yellow; disk an inch or more broad. Along the Rocky Mountains from Montana to Colorado and Arizona; Utah, (Woodhouse.) Bear River Cañon, Utah; 8,000 feet elevation; July. (604.)

HELIANTHELLA MULTICAULIS. Somewhat scabrous and pubescent with minute scattered appressed hairs; stems 1½° high, many from a stout branching woody base; leaves opposite, oblong-lanceolate, 3–4′ long, 7–10″ wide, rather obtuse, nearly sessile, 3-nerved above the base, minutely resinous-dotted; heads solitary, long-peduncled, 2–3′ broad; involucral scales lanceolate, puberulent and ciliate, the outer ones sometimes exceeding the rays; chaff of the receptacle conduplicate, 4″ long, rigidly chartaceous, the tips scarcely pubescent; achenia as in the last, but not so large.—Very near the last, but distinguished from it by the numerous stems rising from a stout underground woody caudex, which lasts many years, by the resin which fills the ultimate veinlets and appears on both surfaces of the leaves in exceedingly minute granules, and by the smaller and much more rigid chaff of the receptacle. Wyeth's specimen of Nuttall's *Helianthus uniflorus* has the smaller leaves of this plant, but the chaff is large and scarious as in the plant last described. East Humboldt Mountains, and on the hills and peaks about Parley's Park, Utah; June, July. (605.)

HELIOMERIS[1] MULTIFLORA, Nutt. *Jour. Acad. Phil., n. s.*, 1. 171. Stems few from a woody root, 1–2° high, simple or branched; leaves nar-

[1] HELIOMERIS, NUTT., *l. c.* Heads many-flowered, radiate; rays neutral; disk-flowers numerous, perfect; the corolla with a very short pubescent proper tube, (*i. e.*, ampliated very near the base,) 5-toothed. Involucre spreading; oblong-linear scales in about 2 rows. Receptacle oblong-conical, covered with persistent lanceolate concave-carinate chaff, partly embracing the disk-flowers and nearly their length. Stamens with broad ovate appendages and blackish anthers. Branches of the style oblong-clavate, slightly hispid. Achenia cuneate-oblong, compressed-quadrangular, entirely destitute of pappus.—Perennial Western North American herbs or suffrutescent plants, with nearly entire mostly opposite leaves and yellow flowers, smaller than those of most *Helianthi*.

rowly or broadly lanceolate, 1–2½° long, 3–6″ broad, more or less scabrous-pubescent, entire or obscurely serrulate; heads 12–16″ broad, mostly terminal on long branches; chaff of the receptacle rather rigid, pungently acute; rays 10–12, oblong-oval, entire or slightly emarginate; achenia compressed-pyriform, scarcely angled, black and somewhat shining.—California to Colorado, and southward to Arizona and New Mexico. Utah, from the foot-hills of the Promontory Range to Bear River Cañon; 6–8,000 feet elevation; July–October. (606.)

CHÆNACTIS [1] XANTIANA, Gray. *Proc. Amer. Acad.*, 6. 545. Sparingly lanulose, soon nearly glabrous; stems 6–9′ high, sparingly branched; leaves 1–2½′ long, linear, with a few distant oblong-linear lobes; heads rather few, 8–10″ long; involucral scales oblong-lanceolate, rather lax, the longest scarcely equaling the corollas; corollas flesh-colored, the outer ones but little larger and not longer than the others; achenia hispid; pappus of 4 inner lanceolate scales, nearly as long as the corolla, and 4 outer ones, very short and broadly cuneate-obcordate.—Near Carson City, Nevada, (Dr. Anderson!) Southern California, (Xantus, Dr. Van Horn!)

CHÆNACTIS MACRANTHA. A span high, pubescent with delicate partly deciduous wool; stems much branched, especially at the base; leaves 1–2′ long, 1–2-pinnatifid with oblong lobes about 1″ wide; scales of the obconic involucre in two rows, linear-lanceolate; corollas 6″ long, flesh-colored, minutely pubescent, narrowly obconic, scarcely expanded at the summit, the marginal ones not appreciably larger than the others; anthers included; branches of the style at length exserted; achenia blackish, hispid; pappus of 4 oblong-linear scales, shorter than the achenia and only half the length of the corollas, and 4 outer oblong-cuneate ones, ¼–⅓ as long as the inner ones.—Near the last, but has more compound leaves and much longer flowers. Foot-hills of Western Nevada, 5,000–5,500 feet elevation; May, June. PLATE XVIII. Fig. 1. A plant; natural size. Fig. 2. Achenium

[1] CHÆNACTIS, DC. Heads many-flowered; flowers all tubular and perfect; the corollas glabrous or puberulent, elongated, narrowly obconic or ampliated above and trumpet-shaped, 5-toothed, the outer ones (rays) more expanded than the rest and often somewhat irregularly ventricose, 5-cleft; teeth or lobes pubescent. Involucre campanulate, the scales oblong-linear, about 20, in 1–2-rows. Receptacle alveolate. Style with very long narrowly linear branches, the upper part hispid. Achenia linear, tapering to the base, striate or quadrangular. Pappus of 4–12 hyaline membranous usually nerveless scales, with erosely denticulate margins, those of the disk-flowers usually much shorter.—Annual, biennial or perennial herbs, natives of Western North America, with alternate 1–3-pinnatifid leaves, and rather large heads terminating the simple or corymbose branches.

and pappus. Fig. 3. Corolla. Fig. 4. Stamen. Fig. 5. Style; all enlarged three diameters. (607.)

Chænactis Douglasii, Hook. & Arn. (*Ch. achilleæfolia*, H. & A.) Biennial and sometimes annual, whitened with a close tomentum, or rarely smoothish; stems from 2′–3° high, simple or much-branched, often several from one root; leaves somewhat fleshy, 1–3′ long, ovate-oblong in outline, 2–3-pinnatifid with very numerous and often crowded minute oblong-obovate or rounded lobes; heads few-many, corymbed; involucres turbinate or campanulate, the oblong-linear scales in 1-2 series; flowers 6–7″ long, whitish or flesh-colored; corollas pubescent; marginal ones scarcely larger; achenia linear, hispid, blackish, as long as the corolla; pappus of about 10 unequal oblong or lanceolate erosely denticulate scales, ½–⅔ as long as the achenium.—A variable plant, presenting numerous forms dependent upon exposure, soil, &c., but none of them can be considered well-marked and permanent varieties. The name *Douglasii*, being older than *achilleæfolia*, is taken for the united species. The larger pappus-scales sometimes have a well-defined mid-nerve. A good figure of a common form of the plant is given in Plate VI of Stansbury's Report. Oregon and California to Colorado and Arizona; Western Nevada, (Bloomer! and Anderson!) Common throughout Nevada and Utah, from 4,000 feet elevation upward; May–October. (608.) A dwarf alpine form, with the leaves having densely crowded minute lobes and the heads few and rather large, is Brewer's 1901, from California, and the same was found on rocky ridges of the Uintas about Bear River Cañon, at 10,000–12,000 feet elevation. (609.)

Chænactis stevioides, Hook. & Arn. Annual, glabrous, or at first puberulent above; stems 6–10′ high, branched from the base, corymbose above; leaves 1–2-pinnately divided, the divisions linear, obtuse, entire, ½″ wide; involucre glandular-puberulent, the scales spatulate-oblong, in two rows; flowers white or flesh-color; corollas tubular-funnel-shaped, the marginal ones shorter and a little more expanded; achenia hirsute; pappus of 4–5 subequal lanceolate acute denticulate scales.—Oregon and California to New Mexico; Strong's Knob, Great Salt Lake, (Stansbury.) Foot-hills and ridges of Trinity Mountains and Reese River Valley, Nevada, and on Stansbury Island, Great Salt Lake; 4–5,000 feet elevation; May–July. (610.)

Chænactis carphoclinia, Gray. *Bot. Mex. Bound.*, *p.* 94. "Annual (?,) at first lanulose, soon glabrous, somewhat viscid; stem much branched;

leaves 1–2-pinnately divided; involucre viscid; corollas whitish (?,) the marginal ones with an expanded limb, but regular and not longer than those of the disk; pappus of 4 ovate-lanceolate acuminate scales; receptacle bearing among the flowers a few (5–10) setaceous palets as long as the involucre."—Deserts of Arizona and Southeastern California. A single specimen with immature heads, but with the chaff of the receptacle very conspicuous, was found on the foot-hills of the Trinity Mountains; 4,800 feet elevation; May. (611.)

HYMENOPAPPUS TENUIFOLIUS, Pursh. Whitened-tomentose; stems 8–15′ high, leafy at the base, sparingly corymbose towards the summit, often several from a rather stout simple or branched perennial caudex; radical leaves petioled, 2–4′ long, 2–3-pinnately divided with numerous oblong-linear lobes less than ½″ wide; cauline ones sessile, similar but smaller, or reduced to simple linear bracts; heads whitish, 4–6″ broad, hemispherical-campanulate; involucral scales oval, appressed, with broad obscurely denticulate scarious margins; corolla-tube very short; achenia more or less silky-villous; pappus of spatulate-oblong obtuse slightly erose scales, nerved to the middle, as long as the tube of the corolla.—Missouri to Dacotah and Montana, and southward to Colorado and New Mexico. Nevada, perhaps in the East Humboldt Mountains; the ticket lost. Specimens with the cauline leaves mostly simple and the achenia less villous than in the Colorado specimens. (612.)

BAHIA[1] LEUCOPHYLLA, DC. Whitish-tomentose; stems 5–15′ high, very many from a somewhat woody base, naked above, leafy; leaves 6–12″ long, obovate-spatulate or cuneate, entire, or more frequently 3-lobed at the apex or even pinnately incised; heads solitary on long naked peduncles, 9–12″ broad; rays oblong-oval; achenia obtusely quadrangular with concave sides, glabrous or glandular-pubescent toward the apex; pappus of very small cuneate-oblong or somewhat quadrate obtuse nerveless erosely toothed scales.—Nutka Sound and Oregon to California; near Virginia City,

[1] BAHIA, LAGASCA. Heads many-flowered, radiate; rays 5–30, pistillate, fertile; disk-flowers tubular, perfect, fertile, corollas glandular-hairy, 5-toothed. Involucre sub-globose or campanulate, the scales appressed in one or two rows. Receptacle convex or conical, naked. Branches of the style in the disk-flowers short, thickened at the apex, and obtuse, or truncate, or with a conical fleshy appendage. Achenia narrowly turbinate or linear, 4-sided. Pappus a crown of short scarious nerveless or rarely 1-nerved and even awned scales.—Perennial herbs or suffruticose plants of Western America, from Nutka to Chili, usually whitish-tomentose, with lobed or incised leaves, and yellow heads on long peduncles or in terminal corymbs.

(Bloomer!) Mountains of Nevada, from the Pah-Ute to the East Humboldt Ranges; 5,500–9,500 feet elevation; June–August. Plant not so white as Brewer's Californian specimens, the very numerous stems often a foot or more high. (613.)

Burrielia[1] nivea. Minute, barely 1′ high, densely covered with white wool; leaves obovate-spatulate; heads solitary on short slender peduncles, 2½–3″ long; involucre of about 8 oblong obtuse scales, smooth within, at length reflexed and showing the hemispherical receptacle; rays 8–9, obovate, scarcely exceeding the involucre, hairy along the tube, and 2–3-toothed at the apex; disk-flowers 6–8, half shorter than the rays, corolla somewhat expanded at the throat; anthers slightly sagittate, the terminal appendage ovate; style of the disk-flowers with the oblong branches tipped with a short obtuse barbellate appendage; achenia obovate-oblong, compressed, villous-ciliate along the thickened margins, otherwise smooth; pappus of 2 concave long-awned ovate denticulate hyaline scales.—In appearance much resembling *B. lanosa*, but differs in the broader leaves, the simple pappus, and especially in the curiously 2-ridged achenium. From the character of *Dichæta* it recedes a little in having a convex and not conical receptacle and in the pappus. *Bahia Wallacei* and *B. rubella* are other plants much resembling this, but the achenium and pappus are very different. Foot-hills of Western Nevada, from the Virginia to the Pah-Ute Mountains; 4–5,500 feet elevation; May, June. Plate XVIII. Fig. 6. A plant; natural size. Fig. 7. Ray-flower; magnified six diameters. Fig. 8. Pappus-scale; magnified twelve times. Fig. 9. Section of achenium; magnified eighteen times. Fig. 10. Style; magnified twelve times. Fig. 11. Corolla of disk-flower. Fig. 12. Same laid open and all but one stamen removed; magnified six times. Fig. 13. Stamen. Fig. 14. Style; each magnified twelve diameters. (614.)

Actinella acaulis, Nutt. Cæspitose, dwarf and acaulescent, villous-pubescent or silky; caudex perennial, simple or branching; leaves all radical,

[1] BURRIELIA, DC., (including *Dichæta*, Nutt.) Heads few-many-flowered, radiate; rays 3–13, pistillate, fertile; disk-flowers tubular, perfect; the corollas with an expanded 5-lobed or 5-toothed limb. Involucre hemispherical or campanulate, the scales usually as many as the rays, oval or oblong, about as long as the disk. Receptacle conical or convex, papillose or with toothed alveoli. Branches of the style truncate and minutely barbellate, or terminated by a very short conical appendage. Achenia obconic or fusiform, quadrangular, or somewhat compressed. Pappus of 2–5 lanceolate or subulate awns, often with several obtuse lacerate scales between the awns, but in one species the pappus is wanting.—Annual, mostly Californian herbs, often very small, with opposite leaves and commonly solitary heads of yellow flowers.

spatulate or linear-obovate, entire, 1–1½′ long; scapes 1–6 high, usually leafless and bearing a single head 9–15″ broad; involucre of 2 rows of oval or oblong scales equaling the disk; rays 10–12, broadly cuneate, 3-toothed and often sprinkled with resinous atoms; pappus of 5–7 broadly ovate scales abruptly tipped with slender awns.—Saskatchewan and the Missouri Basin to Colorado and New Mexico. A glabrous and awnless form (Var. *glabra*, Gray) occurs in Illinois, and it is quite probable that *A. Torreyana* and *A. lanata* are but forms of this species.—East Humboldt Mountains; 7,500–9,000 feet altitude; July, August. (615.)

Actinella Richardsonii, Nutt. Caulescent, puberulent; stems 3–17′ high from a perennial somewhat woody branching caudex, leafy; leaves 3–6′ long; pinnately or irregularly parted into a few long narrowly-linear divisions; heads on long peduncles, loosely corymbose, 1′ broad; involucre much shorter than the disk, the scales in two rows, oblong or ovate, the outer ones united at the base; rays 8–10, oblong-cuneate; disk-corollas densely glandular-puberulent; achenia villous; pappus of 5–7 ovate acuminate or awned scales.—Saskatchewan to Colorado, New Mexico, and Arizona. West base of the East Humboldt Mountains; 6,000 feet; August. (616.)

Var. canescens. Whitish with a soft tomentum; stems a span high or less, bearing 1–3 rather large heads; disk-flowers somewhat elongated; scales of the pappus acute, nearly or quite awnless.—On a peak in the East Humboldt Mountains; 9,000 feet altitude; August. (617.)

Helenium autumnale, L. North America, from Hudson's Bay to Florida and California. Valleys of Northeastern Nevada; 6,000 feet elevation; August, September. (618.) A form with narrower and rigid leaves, the whole plant minutely scabrous, is the same as Lindheimer's 645, and was found at the mouth of American Fork Cañon, in the Wahsatch, at 5,000 feet elevation. (619.)

Helenium Hoopesii, Gray. *Proc. Acad. Phil.*, March, 1863, *p.* 65. Stem stout, somewhat tomentose, 1½–2° high; leaves pale-glaucous, thickish, punctate, smooth or slightly pubescent, entire; radical ones spatulate, narrowed into a short and broad-winged petiole, often very large; cauline ones oblong-lanceolate, semi-amplexicaul; heads 3–6, very large, 2–3′ broad, long-peduncled; involucres whitish-tomentose, the scales oblong-lanceolate; rays 15–20, (20–30, *Gray*,) usually saffron-yellow, lanceolate-spatulate; pappus of lanceolate-subulate obscurely nerved scales, as long as the villous achenium.

—New Mexico (Parry;) Colorado, (272 Hall & Harbour; 286 Vasey,) and California, (1902 Brewer; 6157 Bolander.) On a high divide in the East Humboldt Mountains, and in Bear River Cañon, Uintas; 8,000 feet altitude; July, August. The Nevada plant has smaller leaves and more numerous heads with paler rays than the specimens from Utah and Colorado. (620.)

RIGIOPAPPUS[1] LEPTOCLADUS, Gray. *Proc. Amer. Acad.*, 6. 548. Plant 5–10′ high; a single head terminates the stem, and just below this there rise several simple branches, with heads considerably overtopping the first one; leaves 3–12″ long, ¼–½″ wide; heads broadly obconic, about 4″ long and as many broad at the top.—Oregon, (Dr. Lyall;) Russian River Valley, California, (4678 Bolander;) Carson City, (Anderson.) Foothills of the Pah-Ute and Havallah Ranges, Nevada; 5,500 feet elevation; June. (621.)

BLEPHARIPAPPUS[2] SCABER, Hook. Stem 6–8′ high; leaves 3–4′ long, ½″ wide.—The ray-flowers are sometimes furnished with abortive or rudimentary stamens, as in several other genera. Oregon, east of Walla-Walla; Carson City, Nevada, (71 Anderson!)

LAYIA[3] GLANDULOSA, H. & A. Erect, usually branched from the base

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[1] RIGIOPAPPUS, GRAY, *l. c.* "Heads many-flowered, radiate; rays 5–8, pistillate, fertile, the ligule small and slightly longer than the disk; disk-flowers perfect, the corolla narrowly tubular, 3–4-toothed, the teeth very short. Involucre in two series, shorter than the florets, of subulate-linear rigid scales resembling the leaves of the branchlets. Receptacle flat, naked. Branches of the style in the perfect flowers with the stigmatic portion short, smooth and flattened, and produced into a slender subulate somewhat hispid appendage. Achenia slender, linear, compressed, hispidulous, wrinkled transversely. Pappus simple, of 4–5 rigid somewhat horny narrowly subulate awn-like scales, longer than the corolla, but shorter than the achenium.—An annual slender puberulent herb, with alternate linear leaves; flowering branches few, filiform, rising from the top of a simple stem, leafless below, and bearing single heads; flowers yellowish or white."

[2] BLEPHARIPAPPUS, Hook. Heads few-flowered, radiate; rays about 3, pistillate, the ligules broadly wedged-shaped, 3-5-lobed nearly to the short glandular tube; disk-flowers 7–9, perfect, only the outer ones fertile, proper tube of the corolla short, the throat funnel-shaped, and the border 5-toothed. Involucre of 6–8 elliptical-oblong, subequal scales, membranous on the involute margin and glandular on the back, concave. Receptacle small, bearing a few very delicate scales partly embracing the fertile disk-achenia. Style of the disk-flowers hairy, the glabrous obtuse branches extremely short, stigmatic to the summit. Achenia villous, oblong-obconic. Pappus of 12–20 narrow hyaline pectinately ciliate scales, much shorter than the corolla.—A slender annual, nearly smooth below, the corymbose branchlets glandular-viscid, the leaves narrowly linear, obtuse, entire, scabrous, and the heads of white flowers about 4″ long and nearly as broad.

[3] LAYIA, HOOK. & ARN. Gray. *Pl. Fendl.*, 103. Heads many-flowered, radiate; rays 10–15, pistillate, fertile; the ligule dilated-cuneate, 2-3-toothed; disk-flowers tubular, perfect, the corolla with a short proper tube, funnel-shaped above and 5-toothed. Involucre in a single series, or with a few outer foliaceous bracts; the scales oblong-linear, more or less hispid, foliaceous above, the base with membraneous margins, involute and enclosing the ray-achenia. Receptacle flat, chaffy throughout or near the margin only. Branches of the style in the disk-flowers filiform-subulate, hairy above, at length exserted and recurved. Achenia of the ray glabrous, oblong or obovate, obcompressed, (*i. e*, parallel to the involucral scales,) with a very small epigynous disk but no pappus. Achenia of the disk similar or narrower and sub-clavate, and villous-pubescent; pappus sometimes wanting, but usually present and consisting of several ovate-lanceolate scales or setiform awns, villous or lanate near the base with long soft

and somewhat corymbose above, hispid with rigid spreading hairs; the branchlets, leaves and involucres also sprinkled with stalked blackish glands; leaves oblong-linear, about 1′ long, obtuse, entire; heads 1′ or more broad; rays 8–12, white, 3-lobed at the end; pappus very white, awns about 10, as long as the achenium and one-half longer than the copious spreading hairs at their base.—Plant 4–10′ high; disk-achenia villous with appressed hairs. Oregon and California; Western Nevada, (Bloomer! Anderson!) Valley of Salt Lake, (Stansbury.) Valleys and foot-hills throughout Nevada, and eastward to the Wahsatch; 4,200–6,500 feet elevation; April–July. (622.)

LAYIA HETEROTRICHA, H. & A. Much like the last, but commonly a larger plant, 10–15′ high; the pubescence shorter and harsher, the blackish glands sometimes very few; leaves larger (1–2′ long) and often toothed, especially the lower ones; rays yellowish-white, 8–12, broadly wedge-shaped and 3-cleft at the apex; achenium and pappus as in the last.—California. Western Nevada to Salt Lake City, 4,500–6,000 feet elevation; April–June. (623.)

HEMIZONIA[1] DURANDI, Gray. *Proc. Amer. Acad.*, 6. 549. A small hispid branching annual, 3–6′ high; leaves mostly opposite, narrowly linear, 3–6″ long, sessile; heads very small, (1½″ long,) short-peduncled; involucre globose-pyriform, of 5 glandular-hispid concave and convolute scales, which enclose the ray-achenia; ligules broadly cuneate, 3-lobed; disk-flowers 1 or 2, enclosed in the half-united chaff; ray-achenia arcuate-gibbous, with a very short inflexed beak; disk-achenia straight, oblong-clavate, hairy; pappus none.—California, (Pratten, Rattan!) Washoe County, Nevada, (Stretch.)

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hairs, or ciliate-setigerous, rarely naked.—Annual or biennial herbs of California, etc., glabrous, or mostly hairy or glandular, the opposite or alternate leaves usually pinnately cleft or lobed, the upper ones entire. Heads rather large and showy, the rays white or yellow; anthers dark-colored. The Utah and Nevada species both belong to the section MADAROGLOSSA, which has the awns of the pappus setiform, villous-woolly or plumose toward the base, with very long and slender hairs, the receptacle chaffy only between the outermost disk-flowers and the ray.

[1] HEMIZONIA, DC. Heads few—many-flowered, radiate; rays 4–20, pistillate; ligule 2–3-lobed; disk-flowers perfect, usually infertile, the tubular-funnel-shaped corolla 5-toothed. Involucral scales in one series, concave and partly enclosing the ray-achenia. Receptacle flat, more or less chaffy, the chaff sometimes united in a cup. Branches of the style linear, in the ray glabrous, in the disk with a very hispid subulate appendage. Achenia of the ray glabrous, gibbous-incurved, more or less obcompressed, without pappus; of the disk commonly abortive, oblong, often with a pappus of short lacerate chaffy scales.—Low Californian annuals, with narrow, usually alternate leaves, and small heads of yellow flowers. The single species reported from Nevada is of the section HEMIZONELLA, Gray, *l. c.*—Rays 4–5, the ligule very small, scarcely longer than the style. Disk-flower single, or at most 2, enclosed in a 3–5-toothed cup, formed of the united chaff of the receptacle; achenia all fertile, those of the ray somewhat obcompressed, incurved-gibbous, of the disk straight.

LAGOPHYLLA[1] RAMOSISSIMA, Nutt. Stems 3 12′ high, at first softly pubescent or villous, as are the leaves and involucre, at length smooth and much-branched; primary leaves oblong-spatulate, the lowest ones opposite, petioled, denticulate, caducous, the upper ones alternate and sessile, later ones linear-oblong and passing into bracts appressed to the involucre; involucre 5-leaved, the scales flat on the back, the edges infolded and meeting, completely enclosing the fertile achenia; rays very short, cuneate, 3-cleft; receptacle with 5 subfoliaceous scales surrounding the 5–6 perfect but infertile disk-flowers; achenia smooth; pappus none.—Oregon and California. Foothills of the West Humboldt Mountains and Havallah Range, Nevada; 5–5,500 feet elevation; June–September. (624.)

MADARIA[2] ELEGANS, DC. Everywhere hispid, many of the hairs glanduliferous; stem 1–3° high, branching; leaves 1–3′ long, 2–3″ wide, closely sessile. Var. CORYMBOSA has the leaves hispid but glandless.—Both forms are common in Oregon and California, and were also collected near Carson City, Nevada, by Dr. Anderson.

MADIA[3] RACEMOSA, T. & G. Stems strict, 6′–2° high, afterward branched above, hirsute, as are the oblong-linear leaves; the branchlets, uppermost leaves and the involucres glandular also; heads racemose on the branches; ray-achenia flat, those of the disk somewhat angled on the sides.—Leaves 1–3′ long, 2–4″ wide. Washington Territory to California; Virginia City, (Bloomer.) From Western Nevada to the East Humboldt Mountains; 5–7,000 feet elevation; June–September. (625.)

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[1] LAGOPHYLLA, NUTT. Genus very near to *Hemizonia*, and distinguished from it only by the less convex involucral scales, completely enclosing the fertile achenia, which are truly obcompressed, nearly flat on the back and slightly carinate on the inner face; a distinction which will scarcely be considered sufficient. There are three reputed species, all found west of the Rocky Mountains.

[2] MADARIA, DC. Heads many-flowered; rays 10–20, pistillate, fertile, ligules 2–3 times as long as the involucre, cuneate, 3-cleft; disk-flowers perfect but infertile; the corollas tubular-funnel-shaped, 5-toothed. Involucre sub-globose, the scales as many as the rays, incurved, conduplicate, and enclosing the fertile achenia. Receptacle convex, villous, the margin furnished with 1–2 rows of chaffy scales inside of the rays. Branches of the style in the disk-flowers with lanceolate hispid appendages. Achenia compressed, somewhat incurved, the back thicker than the inner edge, broader towards the top, destitute of pappus.—Annual herbs of California, etc., everywhere hairy and often furnished with minute stalked glands; leaves linear or lanceolate; heads showy, 12–15″ broad, the rays yellow, sometimes purple-spotted at the base.

[3] MADIA, MOLINA. Heads few—many-flowered; rays 5–12, pistillate, fertile, the ligule slightly exserted and 3-cleft; disk-flowers perfect, fertile, the corollas tubular, 5-toothed. Receptacle flat, smooth, and bearing 1–2 series of chaffy scales inside the ray-flowers, usually somewhat united. Style of the disk-flowers with lanceolate acute branches, minutely hispid on the margins. Achenia of the ray oblong-obovate, slightly incurved, compressed, the sides usually somewhat angled; of the disk straight, compressed, not angled. Pappus none.—Annuals or biennials of Western America, with the aspect of *Madaria*, and similar hirsute and often glandular stems, leaves and involucre; the rays less showy.

AMIDA HIRSUTA, Nutt. Hirsute with both short appressed and long spreading hairs, as well as more or less beset with stalked glands; stem 10–18′ high, leafy; leaves about 2′ long, 1–2″ broad; heads somewhat corymbed at the top of the stem.—Said to be a stouter plant than *A. gracilis*, and with broader and more carinate involucral scales, but there is probably but one species, and that should properly be reduced to *Madia*, where Hooker originally put it. Saskatchewan to Oregon and Colorado, (Parry in 1864, and 364 Vasey.) Parley's Park in the Wahsatch; 6,000 feet elevation; July. (626.)

MARUTA COTULA, DC. A European weed, now naturalized throughout the United States; also in Canada and parts of South America. Roadsides in Central Nevada; 5,000 feet elevation. (627.)

ACHILLEA MILLEFOLIUM, L. Throughout North America, Europe, and Northern Asia; Mount Davidson, (Bloomer!) Truckee Valley, and on the Havallah, East Humboldt, and Clover Mountains, Nevada, from the base to the peaks, and common in the Wahsatch and Uintas; 4–10,000 feet altitude. (628.)

Var. ROSEA, T. & G., was found along stream-banks in and near Parley's Park, Utah, but was not seen in Nevada. (629.)

MATRICARIA DISCOIDEA, DC. California to Alaska and Eastern Asia. Naturalized near St. Louis, and introduced into Europe. Foot-hills of the Trinity Mountains, Nevada, and in Jordan Valley, Utah; May. Prof. Brewer states that this is a great remedy for fever and ague with the native Californians. (630.)

TANACETUM CANUM. Suffruticose, minutely tomentose-canescent; stems 8–10′ high, branched below, leafy to the top; leaves 6–12″ long, 1–1½″ wide, sessile, linear-obovate, simple or 3-cleft at the apex; heads congested in small terminal corymbs, sub-globose; involucre cup-shaped, of about 12 oval or ovate scarious-margined concave scales in two rows; receptacle conical; florets about 100, all apparently fertile (?); 4–8 of the outer ones pistillate only, and with the truncated corolla contracted and pubescent at the top, the

[1] AMIDA, NUTT. Heads 2–6-flowered; rays often none, but sometimes one or two, pistillate and fertile, with a very small cuneate 3-lobed corolla; the other flowers tubular, perfect and fertile; corolla slightly expanded upwards, pubescent, 5-toothed. Involucre obovate-oblong, few-bracted, the scales concave, carinate, as many as the flowers, and each enclosing an achenium. Receptacle small, naked. Achenia oblong-obovate, incurved, compressed, slightly angled on the sides, smooth and black, without pappus.—Slender hirsute annuals of Western North America, with the habit and most of the characters of *Madia*; leaves sessile, linear, entire; heads in small terminal or axillary clusters.

branches of the style exserted and slightly recurved; remaining florets perfect, corolla 5-toothed, branches of the style included, truncate and with a few ciliæ at the middle of the ends; immature achenia oblong-top-shaped; pappus none.—With much the appearance of *Artemisia cana*, but the broad-topped achenia are characteristic of *Tanacetum*. Whether this is to be referred to the section *Sphæromeria* or not, must be decided by the examination of maturer specimens. Limestone rocks at the mouth of a cañon in the East Humboldt Mountains, Nevada; 6,500 feet elevation; July. PLATE XIX. Fig. 8. Portion of a plant; natural size. Fig. 9. Receptacle. Fig. 10. Involucral scale; each enlarged four diameters. Fig. 11. Outer pistillate fertile flower. Fig. 12. Inner perfect flower; each enlarged eight diameters. Fig. 13. Style of perfect flower. Fig. 14. Stamen; each enlarged twelve diameters. (631.)

TANACETUM DIVERSIFOLIUM. Suffruticose, glabrous, branched from the base; branches 8–15′ high, leafy to the top; leaves 1–2′ long, ½–1″ wide, sessile, narrowly linear, 1-nerved, or pinnatifid with 1–4 linear-oblong 1-nerved divisions; heads small, sub-globose, congested or laxly disposed in terminal corymbs; peduncles and involucres puberulent, the latter cup-shaped, of 12-15 oval scarious-margined concave scales; receptacle conical; florets 60–70; outer pistillate ones 8–10, with a 3–4-lobed corolla a little shorter than the style; inner perfect ones, 5-lobed branches of the style very minutely penicillate at the broad truncate extremities; achenia oblong, crowned with a slightly elevated ring.—A dense much-branched plant, shrubby at the base, in habit not unlike some narrow-leaved *Linosyris*. Central flowers with a rudimentary seed, but possibly infertile. Cañons of Cottonwood Creek and American Fork, in the Wahsatch; 6,000 feet elevation; July, August. PLATE XIX. Fig. 1. A single stem; natural size. Fig. 2. Receptacle. Fig. 3. Involucral scale; each enlarged four times. Fig. 4. An outer pistillate fertile flower. Fig. 5. An inner perfect flower; each enlarged eight times. Fig. 6. Stamen. Fig. 7. Style of inner flower; each enlarged twelve times. (632.)

ARTEMISIA SPINESCENS. (*Picrothamnus desertorum*, Nutt.) Low, frutescent, densely-branched, white-tomentose; leaves scarcely 3″ long, pedately 3–5-parted, the divisions 3-lobed, lobes oblong; heads rather small, globose, in short axillary racemes or spikes, the rachis persistent 2–3 years and spinescent; involucral scales 5–6, obovate, obtuse, concave; receptacle small,

naked; florets densely woolly, the 1–4 outer ones pistillate and fertile, having short truncate obscurely 2–3-toothed corollas, branches of the style exserted, smooth; achenia oblong-obovate; inner florets 4–8, perfect but sterile, corollas inflated-funnel-form, 5-toothed, styles undivided, expanded and radiately penicillate at the summit.—Plant 4–18′ high, very bitter to the taste. North sources of the Platte, (Nuttall;) Laramie plains, in alkali-flats, (D. C. E.) Abundant in the valleys of Nevada, and also collected on the islands of Great Salt Lake; June. There is no good reason why this should not be an *Artemisia*, of the section *Dracunculus;* the style of the sterile florets is precisely that of *A. borealis, caudata*, etc., and the other characters are not discordant with the genus. PLATE XIX. Fig. 15. A branchlet; natural size. Fig. 16. A leaf; enlarged two diameters. Fig. 17. An involucral scale; enlarged four diameters. Fig. 18. An outer pistillate fertile floret. Fig. 19. An inner perfect but sterile floret; each enlarged eight diameters. Fig. 20. A stamen. Fig. 21. The style of a perfect floret; each enlarged twelve diameters. (633.)

ARTEMISIA DRACUNCULOIDES, Pursh. Saskatchewan to California, and Texas; eastward to Illinois. Common throughout Nevada, mostly in the valleys and lower cañons, and collected at the City of Rocks in Southeastern Idaho; August–October. (634.)

ARTEMISIA FILIFOLIA, Torr. Stems 1–3° high, with slender virgate panicled branches; leaves 1–2′ long, whitish-tomentose, becoming smooth, filiform with revolute edges, the lower ones mostly 3-parted; heads in dense leafy panicles, very small, tomentose, 3–5-flowered; two florets pistillate and fertile, with short truncate corollas, the rest perfect but sterile, the corollas funnel-form, 5-toothed; styles as in *A. spinescens*, etc.—Colorado and the plains of the Upper Platte, extending to New Mexico and Arizona. Green River, Utah, (Gunnison.)

ARTEMISIA TRIDENTATA, Nutt. Shrubby, 1–6° high, much-branched, branches spreading; leaves crowded, cuneate-oblong, 6–12″ long, usually 3-toothed at the apex, the teeth short and obtuse; those of the dense compound leafy panicles linear and entire; all finely tomentose-canescent like the branchlets; heads obovoid, 5–6-flowered; outer involucral scales tomentose, very short; inner ones longer, scarious; florets all perfect and fertile; corollas funnel-form, 5-toothed, the proper tube very short; styles 2-cleft, the branches widened slightly upward, truncate and somewhat penicillate.—A

pale greenish shrub, with ragged fibrous bark and a strong aromatic smell, the "sage-brush" of the West, covering hundreds of square miles in the plains and on the foot-hills of Nevada and Utah, found more sparingly in the mountains to their summits, and extending from Oregon to Arizona, and as far east as the mountains of Colorado; 4–10,000 feet altitude; September. (635.)

Artemisia arbuscula, Nutt. Dwarf, shrubby, canescent; stems 3–6′ high; leaves narrowly cuneate, 4–5″ long, deeply 3-cleft, the side divisions often 2–3-lobed; heads ovoid, sessile singly or in small clusters along a simple or sparingly-branched rachis; involucre of oval tomentose imbricated scales, the outer ones shortest, inner more scarious; florets about 8, all perfect and fertile, the corollas a little more slender than in the last, and the styles similar.—Arid plains of Snake River, (Nuttall;) Colorado, (Vasey, 308.) On a peak in the East Humboldt Mountains; 9,000 feet elevation; August. (636.)

Artemisia trifida, Nutt. Shrubby, 6–18′ high, canescent; leaves narrowly cuneate, 3- or rarely 4–5-cleft, the lobes linear or oblong, obtuse; heads narrowly obovoid, arranged in small peduncled clusters forming a narrow elongated panicle; involucral scales imbricated; the outer scales oval, tomentose; inner ones obovate, scarious; florets about 3, all perfect and fertile; corollas and styles as in the last.—A taller and more slender plant than *A. arbuscula*, with more compound inflorescence, narrower heads, and fewer florets—3 in all the heads examined, though said to be 8 by Torrey and Gray; possibly a misprint; for Nuttall says of *A. arbuscula*, "Capituli twice as large" as in *A. trifida*. Washington Territory; Oregon and California. Scattered throughout Northern Nevada, often in company with *A. tridentata*, which it greatly resembles in habit, though smaller, and sometimes itself covering large areas; 5–8,000 feet elevation; August, September. (637.)

Artemisia potentilloides, Gray. *Proc. Amer. Acad.*, 6. 551. Silky-canescent, many-stemmed from a perennial woody caudex; stems herbaceous; 9–12′ high; radical and lower leaves 2–3′ long, 2–3-pinnately cleft, the numerous linear divisions 2–4″ long and ½″ wide; upper leaves gradually smaller, simply pinnatifid with linear obovate divisions; uppermost simple and bract-like; heads 3–6, corymbose, hemispherical, 3–4″ broad; involucre cup-shaped, of about 10 equal obovate scales with hyaline edges; receptacle convex, very hirsute; florets exceedingly numerous, all alike, perfect and fertile;

corollas obconic; branches of the style truncate and penicillate.—Carson City, (Anderson, 229!) In the very hirsute receptacle this plant recedes from the character of *Seriphidium*, in which section it is placed by Dr. Gray. The filaments are considerably dilated just below the anthers, as if the connective were produced below the anther-cells.

ARTEMISIA DISCOLOR, Dougl. Suffruticose; stems 1–2° high, glabrous, simple below; leaves 1–3′ long, mostly smooth above, beneath paler and webby tomentose, pinnately lobed with lanceolate pointed entire or sparingly toothed segments, the edges revolute; heads sub-globose, 1½–2″ broad, disposed in an elongated virgate raceme or strict panicle; involucre at first tomentose, cup-shaped; the outer scales ovate; inner ones oval, with hyaline ciliate-fringed margins; receptacle smooth; florets numerous; a few of the outer ones pistillate, fertile, with very slender corollas, and smooth branches of the style; the rest perfect, fertile, with funnel-form corollas, and truncate penicillate styles.—Subarctic America and the Saskatchewan, to Oregon, California, and New Mexico. East and West Humboldt Mountains, Nevada, and in the Wahsatch near Parley's Park; 7–9,000 feet altitude; July–September. (638.)

ARTEMISIA LUDOVICIANA, Nutt. Saskatchewan to Oregon, California, and Arizona, and eastward as far as Illinois and Michigan, appearing under a great variety of forms. Common throughout Nevada and Utah, but confined to the stream-banks and valleys, at 4–6,500 feet elevation; August–October. The specimens collected illustrate three principal forms, viz:—

Var. DOUGLASIANA. (*A. Douglasiana, T. & G.*) White-tomentose throughout; leaves long-lanceolate, acute, entire; panicle ample; heads rather large. (639.)

Var. LATIFOLIA, T. & G. Tomentose-canescent; leaves elliptical-lanceolate, rather short; heads middle-sized. (640.)

Var. LATILOBA, Nutt. Leaves mostly pinnatifid or trifid, the lobes and the upper leaves broadly lanceolate; the upper surface commonly less tomentose than the lower, or even becoming smooth; heads middle-sized or rather large. (641.)

ARTEMISIA BIENNIS, Willd. Northern British America to Ohio, and westward to California; now naturalized about Buffalo, Philadelphia, and Staten Island, N. Y. Common in the mountain cañons of Nevada; 5–6,000 feet elevation; September. (642.)

ARTEMISIA FRIGIDA, Willd. Wisconsin to the Saskatchewan and Washington Territory, and along the mountains eastward to New Mexico. East Humboldt Mountains, on a ridge 8,000 feet high, and in the Bear River bottom near Evanston, at 6,000 feet elevation; July, August. (643.)

ARTEMISIA SCOPULORUM, Gray. *Proc. Acad. Phila.*, March, 1863, *p.* 66. Cæspitose; caudex creeping, scaly with vestiges of former leaves; stems 3–8′ high, simple; leaves, like the stem, silky-hairy; the radical ones 1–2′ long, bipinnately cleft into a few very narrow linear divisions; upper ones gradually smaller and simpler, passing into linear bracts; heads hemispherical, 2–3″ broad, short-stalked, forming a spike or raceme interrupted below; involucral scales oval, villous on the back, and having a broad scarious dark-brown or blackish border; receptacle very villous with hairs as long as the florets; florets 18–30; a very few of the outer ones with imperfect corollas, pistillate, fertile; the others perfect and fertile, with funnel-form corollas.—Colorado, (41 Parry in 1862, 299 Hall & Harbour, 313 Vasey.) Uinta Mountains, Bear River Cañon, in a rocky gorge and by an alpine lake; 10–12,000 feet altitude; August. (644.)

GNAPHALIUM LUTEO-ALBUM, L., Var. SPRENGELII. (*G. Sprengelii*, Hook. & Arn.) Annual, whitened with loose wool; stems 6–30′ high, simple below, corymbose with long branches toward the summit, (sometimes unbranched;) leaves slightly decurrent; lower ones 2–3′ long, linear spatulate, obtuse; upper ones linear-lanceolate, acute; heads clustered; involucral scales shining, yellowish-white, scarious, oblong-ovate, rather obtuse; pistillate florets very numerous, in several rows outside of the perfect ones; achenia ½ larger and smoother than in the European plant.—Oregon and California, to New Mexico and Texas. Banks of the Truckee River and in Humboldt Pass, Nevada, and by a ditch in a meadow in Utah Valley; 4–6,000 feet elevation; August, September. (645.)

GNAPHALIUM PALUSTRE, Nutt. Low, 1–9′ high, white-floccose; stems several or many, from an annual fibrous root, ascending, branched; leaves spatulate-oblong or oblong-linear, 8–12″ long, 2–2½″ broad, the lower ones narrowed at the base; heads in small very woolly and leafy terminal and axillary clusters; involucral scales linear, rather obtuse, the base greenish, hidden in wool, the upper part scarious, white or brownish-white; florets numerous, a few only of the central ones perfect; achenia smooth or very minutely scabrous.—Oregon and California to Wyoming and New Mexico;

Virginia City, (Bloomer.) Common in wet places throughout Nevada, and probably through Utah, though collected only in Parley's Park; 4–8,500 feet elevation; June–September. Very much like the Eastern *G. uliginosum*, but has broader leaves and is more densely woolly. (646.)

Antennaria margaritacea, R. Br. Canada and Newfoundland, southward along the Alleghanies, and westward to Alaska, Oregon, and California. Cottonwood Cañon in the Wahsatch; 6,000 feet elevation; July. (647.)

Antennaria Carpathica, R. Br. Cæspitose; stems simple, the sterile ones not stoloniferous; radical leaves narrowly oblanceolate, acute, 3-nerved, villous-tomentose on both surfaces; upper leaves gradually smaller; heads in a capitate terminal corymb; involucre woolly at the base, the scales brownish, with paler crisped and scarious shining tips, more acute in the fertile than in the sterile heads.—Arctic America to Labrador and the Saskatchewan. Wet mountain-side in the Havallah range, Nevada; 7,000 feet elevation; June. Plant usually 4–6′ high. (648.)

Var. pulcherrima, Hook. Considerably taller than the typical form, (9–8′ high,) silvery-tomentose; corymb rather lax; involucral scales of firmer texture, the tips white, not crisped.—Swamps among the Rocky Mountains of British America; Colorado, (Hall & Harbour.) East Humboldt and Clover Mountains, Nevada; 9–9,500 feet elevation; August, September. (649.)

Antennaria alpina, Gærtn. Cæspitose, producing stoloniferous flowerless stems; flowering stems 2–8′ high, simple; leaves 6–9″ long, white-tomentose, the radical ones spatulate, the cauline linear; heads 3–7, nearly sessile in capitate clusters; involucre somewhat woolly at the base, the scales olivaceous with paler and erosely-denticulate narrowed tips, rather obtuse in the sterile heads, but acute in the fertile; pappus of the sterile flowers strongly clavate.—Arctic America to Labrador, Alaska, California, and Colorado; Greenland, Norway, &c., but not in the Alps. East Humboldt Mountains, and at the head of Bear River in the Uintas, often by the shores of small lakes; 9–10,000 feet elevation; August. (650.)

Antennaria dioica, Gærtn. In habit very similar to the last, but the leaves sometimes becoming smoothish on the upper surface, clusters more lax, and heads often more numerous; involucral scales broader and firmer, the lips ochroleucous or white, but varying to rose color and to olivaceous;

outer scales very obtuse, the innermost narrower and rather acute.—Arctic America, and from Newfoundland and Labrador to California; mountainous parts of Europe and Northern Asia. In Nevada and Utah, from the Havallah Mountains to the Uintas; 6,000–10,000 feet elevation. (651;) and Var. ROSEA, (652.)

ANTENNARIA DIMORPHA, T. & G. Dwarf, cæspitose; stems ½–2′ high from a somewhat woody entangled caudex; leaves 2–12″ long, silvery-tomentose; the radical spatulate, their bases inclosing large ovoid-fusiform white-woolly leaf-buds; stem-leaves linear, the uppermost exceeding the solitary top-shaped heads; sterile heads with ovate-lanceolate scarious brownish involucral scales, the outer ones shorter and woolly at the base, pappus strongly barbellate toward the ends; fertile heads larger, the inner involucral scales lanceolate-acuminate, equaling the very slender and nearly smooth setæ of the pappus.—Two forms occur:—

Var. NUTTALLII. Stems 4–6″ high; leaves proportionately small; fertile heads 3–4″ long; styles slightly exserted. (653.)

Var. MACROCEPHALA. Stems 8–15″ high; leaves often 1′ long, very silky, and the pod-like buds very large; fertile heads 7–9″ long; styles sometimes exserted, but often only half as long as the corolla. (654.) Both forms occur on the foot-hills from the Sierras to the Wahsatch, at 4,500–6,000 feet elevation; May, June. The smaller form was collected near Virginia City by Bloomer, and in the Black Hills of the Platte by Nuttall.

ARNICA LONGIFOLIA. Many-stemmed from a scaly caudex, minutely scabrous-puberulent; leaves in 5–6 pairs, elongated, lanceolate, acuminate, denticulate, the upper pairs sessile and slightly connate-amplexicaul, the lower with sheathing connate petioles; heads 1–8, commonly 5, not large; involucral scales lanceolate, acute; achenia minutely glandular, but not hispid.—Stems 14–24′ high; leaves 5–6′ long, 7–10″ broad, the very lowest reduced to ocreate scales. In dense clumps among rocks, Clover Mountains, Nevada, and in the Uintas above Bear River Cañon; 10,000 feet altitude; August, September. (655.)

ARNICA ANGUSTIFOLIA, Vahl. Hirsute or hairy; leaves lanceolate, 3–5-ribbed, entire or remotely denticulate, radical ones and the lowest pair tapering into short petioles; cauline in 1–3 pairs, sessile; heads 1–3; involucre villous-hirsute, [woolly, *T. & G.*;] achenia hirsute.—Arctic America and

Greenland, and from Labrador to Alaska, and southward to Colorado and California. Havallah range, Nevada; 5,000 feet elevation; June. (656.)

Arnica Chamissonis, Lessing. Hirsute-canescent; leaves oblong-lanceolate, acute or rather obtuse, entire, rarely slightly denticulate, 3–5-nerved; radical and lower cauline ones narrowed into short petioles, the rest (2–6 pairs) sessile; heads smaller than in the last; involucres finely villous-pubescent; achenia minutely hirsute.—Very near the last, into which Dr. Gray (*Pl. Hall & Harbour*, *p* 68) admits that it passes, but it is more leafy, and the leaves are paler or somewhat canescent. Both these species are united with *A. montana* in Dr. Hooker's "*Distribution of Arctic Plants.*" Subarctic America and Alaska to the Saskatchewan; Oregon; California and Colorado; Carson City, Anderson. On the Truckee River, Nevada, and in Parley's Park and Bear River Cañon, Utah; 4–8,000 feet elevation; July. (657.)

Arnica mollis, Hook. Mountains of New Hampshire and Northern New York; Lake Superior, and Rocky Mountains of British America to Colorado and California. *A. amplexicaulis*, Nutt., from Oregon differs in scarcely any respect. East Humboldt Mountains and Uintas, 6,500–10,000 feet elevation; July, August. (658.)

Arnica latifolia, Bongard. Slightly hirsute-pubescent; stems nearly 1° high from a slender, creeping caudex; leaves thin, ovate, acute, coarsely and sharply toothed; the radical on long slender petioles; the cauline in 2–3 pairs, all but the lowest closely sessile by a cordate base; heads solitary, or with 1–2 additional ones from the uppermost axils; involucre hairy at the base, glandular above, the scales lanceolate, acute; achenia nearly smooth.—Alaska to Oregon, California, Utah, and the mountains of Colorado. Wahsatch Mountains; 9–9,500 feet elevation; July. (659.)

Arnica cordifolia, Hook. Woolly-pubescent, in age becoming nearly smooth; caudex slender, creeping; stems 6–14′ high; leaves thin, ovate, entire, denticulate or even sharply toothed; the radical ones roundish, deeply cordate, obtuse, on slender petioles; the cauline in 1–3 pairs, on shorter petioles, less deeply cordate and more acute; the highest pair sessile; heads 1–3, on long peduncles, rather large; involucres villous-pubescent, the scales lanceolate, acute; achenia hirsute-pubescent.—Saskatchewan to Oregon and Colorado; California, (Var. *discoidea*, Gray.) Frequent in the East

Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 7–10,500 feet elevation; June–September. (660.)

SENECIO LUGENS, Richardson. Perennial, white-tomentose, deciduously lanate, or nearly smooth; stems 6′–2° high, often several from one root; leaves toothed or denticulate with gland-tipped teeth, sometimes entire, obscurely veined, 2–5′ long, 6–12″ wide; the radical obovate or spatulate, obtuse, narrowed into a petiole; the cauline sessile and partly clasping, gradually becoming lanceolate and passing into subulate bracts; corymb open or dense; heads rather large; involucre with a few bractlets at the base, (calyculate,) the scales linear-lanceolate, acute, the tips usually blackish and seemingly withering, (sphacelate;) rays 10–12, twice as long as the involucre; achenia glabrous.—Occurring in one form or another from Arctic America to Oregon and California, and eastward to the Saskatchewan and the mountains of Colorado. Referred to the European and Asiatic *S. campestris*, DC., by Dr. Hooker. The numerous specimens examined may be arranged in three leading forms or varieties:—

Var. HOOKERI. (*S. lugens*, Hook. *Fl. Bor. Am.*, 1. 332, *t.* 114.) "Deciduously tomentose or naked, simple; leaves entire, glandular toothed; radical oblong-subspatulate, cauline lanceolate, acute, somewhat clasping; corymb dense; scales of the involucre conspicuously sphacelate." Hook, *l. c.*—Varies with the leaves broader or narrower, and the corymb more lax and open. Hall & Harbour's 316 and Bolander's 5063 represent this form. From the vicinity of Salt Lake City to the Uintas near Bear River, frequent; 4,500–10,000 feet elevation; May–August. (661.)

Var. PARRYI. Nearly glabrous, though at first slightly webby; leaves mostly not toothed, rather broad; involucral scales scarcely or not at all blackened at the tips.—Parry's 21, Hall & Harbour's 326, Vasey's 332, are examples of this form. Frequent from the base of the Sierras to the East Humboldt Mountains; 4,500–9,000 feet elevation; May–August. (662.)

Var. EXALTATUS. Stem and corymb densely webby-tomentose; leaves ample, more or less whitened, finely glandular-denticulate or entire; heads small, in a dense compound somewhat umbel-like corymb; scales of the involucre with a dark mid-vein, and the ends somewhat blackened.—One of the forms of *S. exaltatus*, Nutt., fide Gray, *Pl. Hall & Harbour, p.* 64. Colorado, (Parry, 23! Hall & Harbour, 325! Vasey, 335!) New Mexico, (Fendler.)

Uintas, on a ridge above Bear River Cañon; 9,000 feet elevation; August. (663.)

SENECIO HYDROPHILUS, Nutt. Perennial, glabrous; stem solitary, simple, striate, 2–3° high; leaves thickish, broadly lanceolate, acute, entire or obscurely repand-denticulate, the midrib very broad; lower ones 6–7′ long, 1½–2′ broad, narrowed into a short petiole dilated at the base and clasping; upper ones gradually smaller, sessile, partly clasping; heads small, in a rather dense compound nearly naked corymb; involucres obscurely calyculate; the scales lanceolate with a minute blackened point; rays small, 3–6; achenia glabrous.—Wyoming and Colorado to California; Valley of Great Salt Lake, (Stansbury.) Wet meadows in Ruby Valley, Nevada, in Parley's Park, and at the head of Echo Cañon in the Wahsatch; 6–7,000 feet elevation; July–September. (664.)

SENECIO TRIANGULARIS, Hook. Glabrous; stems 2–4° high, simple, striate, leafy, 3–4 growing from one root; leaves 3–5′ long, 1½–3′ wide, deltoid-ovate or triangular-lanceolate, sharply and unequally repand-dentate or cut-toothed, acute, truncate or subcordate at the base, all but the uppermost on slender, often winged, petioles; heads rather large, 6″ long, few in a loose or sometimes fastigiate corymb; involucres subcylindraceous, with a few linear-subulate bractlets at the base, the scales about 15, lanceolate with sphacelate tips; rays 6–9, (10–12, *T. & G.*,) less than twice as long as the involucre; achenia striate, glabrous.—Alaska to California, Saskatchewan and Colorado. Banks of creeks and wet places, East Humboldt Mountains and Uintas; 7–8,000 feet elevation; July, August. (665.)

SENECIO ANDINUS, Nutt. Glabrous; stems many from one root, 2–4° high, simple, striate, very leafy; leaves 3–5′ long, 3–10″ wide, linear-lanceolate, acute at both ends, serrulate, often sharply so; upper ones sessile; lower ones short-petioled; heads 4″ long, very numerous in panicled corymbs; involucres calyculate with small subulate bractlets; rays 5–8, disk-flowers 12–20; achenia glabrous.—*S. Serra* has fewer and larger heads, as in *S. triangularis*, and the leaves are sharply serrate with incurved teeth Oregon to Southern Idaho and "Rocky Mountains at 41°," (Nuttall!) Near Carson City, Nevada, (Anderson!) Banks of streams, Havallah and East Humboldt Mountains, and along the eastern base of the Wahsatch; 5,500–8,000 feet elevation; June–August. (666.)

SENECIO AUREUS, L. The typical form, with roundish-ovate cordaet

crenately-serrate radical leaves, and the cauline ones lyrate or lanceolate, pinnately toothed and cleft. British America, and the Northern United States to Nevada and California. East Humboldt Mountains; 6,500–9,000 feet elevation; August. (667.)

Var. OBOVATUS, T. & G. Radical leaves roundish-obovate or broadly spatulate, toothed or serrated.—Throughout British America and the United States to Virginia, and westward to Nevada. Smooth forms; plant rather low. Pah-Ute range, Ruby Valley, and East Humboldt Mountains, Nevada; 5–9,000 feet elevation. (668.) Also a lanuginous form, mostly taller, 15–20′ high. Wahsatch Mountains; 8,000 feet elevation; June–August. (669.)

Var. BOREALIS, T. & G. Smooth; radical leaves thickish, obovate or spatulate, entire or crenulate-toothed at the apex only.—Arctic America, and along the Rocky Mountains to New Mexico. Ruby and Goose Creek Valleys, Nevada; 6–6,500 feet elevation; July–September. (670.)

Var. CROCEUS, Gray. *Proc. Acad. Phil.*, March, 1863, *p.* 68. Smooth; radical leaves roundish-oval, more or less crenately toothed, cauline ample; corymb rather compact; rays saffron-yellow.—Mountains of Colorado. City Creek Cañon, Wahsatch, and Bear River Cañon, Uintas; 6–8,000 feet elevation; May–August. (671.)

SENECIO CANUS, Hook. Whitish-tomentose throughout; stems tufted, 2–12′ high; radical leaves obovate, obtuse, narrowed into short petioles; the cauline sessile, lanceolate, pinnately cleft, or with a few teeth near the base, rarely entire; heads rather large, few in a simple corymb; involucre nearly ecalyculate; rays 8–12, not twice as long as the involucre; achenia glabrous.—Saskatchewan to Oregon and California, the Upper Missouri and Colorado. Peaks of East Humboldt Mountains, and of the Uintas; 9–12,500 feet altitude; July, August. Dwarf alpine forms, 2–4′ high, like Brewer's 1905. (672.)

Var. ERADIATUS. Rays none; radical leaves few-toothed at the apex, cauline nearly entire.—Plant 4′ high. Top of a high peak in the East Humboldt Mountains; 10,000 feet elevation; August. (673.)

SENECIO FENDLERI, Gray. *Pl. Fendl.* 108. Perennial, webby-canescent, at length nearly smooth; stems a foot high or less, solitary or few from a single tap-root, leafy, corymbose at the summit; leaves obovate-oblong, deeply lyrate-pinnatifid, the lower and radical ones narrowed into a short wingless petiole; upper ones sessile; segments cuneate-oblong, numerous, incisely

toothed or 2–3-lobed, terminal one on the lower leaves often roundish and coarsely toothed; heads many in a compound corymb; involucres bell-shaped, almost ecalyculate; the scales glabrous, 12–15, 3″ long; rays 7–12, 4–5″ long; achenia glabrous.—Forms with the leaves less incised approach *S. aureus*, and those with much incised leaves resemble *S. multilobatus*, but the plant is smaller, has fewer stems, and is almost always somewhat webby-tomentose. New Mexico, Utah and Nevada. Frequent from the West to the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–9,000 feet elevation; May–August. (674.)

Senecio multilobatus, T. & G. *Pl. Fendl.* 109. "Annual or biennial, [and probably sometimes perennial, webby pubescent but] very soon glabrous; stems very many, a foot high, simple, corymbose at the summit; leaves somewhat fleshy, the primary ones spatulate, often entire; later ones all pinnately 9–21-parted; lower ones long-petioled, the uppermost sessile, the base scarcely or not at all auriculate; segments cuneate-oblong, incisely toothed or 2–3-lobed at the apex; corymb dense, the heads numerous; involucre nearly ecalyculate, of 12–14 scales; rays 5–6, oblong; disk-flowers 20–30; achenia strigosely puberulent.—Abundant on the Uinta River, (Frémont.) Common on the foot-hills about Salt Lake City and in the lower cañons of the Wahsatch; also on Antelope Island; 4,500–6,000 feet elevation; June. The specimens collected were apparently perennial; the rays are 7–8, and the achenia quite glabrous, and strongly striated lengthwise. The plant grows in dense clumps. (675.)

Senecio filifolius, Nutt. Perennial, suffruticose, densely webby-canescent or glabrous; stems a foot or more high, leafy; leaves pinnately parted, the divisions 3–9, narrowly linear, 6–15″ long, 1″ wide, the margins revolute; heads in a terminal corymb, rather large; involucre somewhat calyculate; rays 7–8, linear, rather long; achenia canescently strigose.—From the Upper Missouri to New Mexico and California. Green River, Utah, (Stansbury.)

Senecio eremophilus, Richardson. Perennial, glabrous; stems striate, numerous, 2–3° high, corymbosely branching toward the summit, leafy; leaves short-petioled, 2–3′ long, 6–12″ wide, the lower ones sometimes much larger, oblong-lanceolate, deeply incised with unequal ovate-lanceolate toothed segments; heads many, in compound corymbs; involucres cylindrical-bell-shaped, calyculate with a few long spreading bractlets; scales often black-

tipped and sphacelate; rays 7–9, rather long; achenia striate, glabrous.—Mackenzie River to the Saskatchewan, and southward to Colorado and New Mexico. Near Salt Lake City, (Mrs. Carrington, *fide* Durand.) Cañons of the Wahsatch and Uintas; 6–9,000 feet altitude; July, August. (676.)

SENECIO FREMONTII, T. & G. Gray, *Proc. Acad. Phil.*, March, 1863, *p.* 67. Perennial, glabrous; stems 1-several, 3–15′ high, leafy to the top; leaves sessile, oblong or spatulate-obovate, somewhat fleshy, laciniately toothed or obscurely dentate; upper ones 9″–2′ long, lower ones gradually smaller; heads short-peduncled, erect, solitary or few and corymbose; involucre bell-shaped, 4–6″ long, scarcely calyculate; rays 10–16, one-half longer than the involucre; achenia glabrous, (puberulent, *Gray.*)—Wyoming and Colorado, in high alpine regions; also in the Rocky Mountains in 49° north latitude, (Dr. Lyall.) Cottonwood Cañon, Wahsatch, and in the Uintas above Bear River Cañon; 8–12,000 feet elevation; July, August. Plants much branched from the base, and with leaves much smaller than those of the Colorado specimens of Parry, Hall & Harbour, &c. (677.)

SENECIO AMPLECTENS, Gray. *Proc. Acad. Phil.*, March, 1863, *p.* 77. "Deciduously floccose-woolly, soon glabrate; stem 6–18′ high from a perennial root, naked toward the summit, and bearing 1–3 heads; leaves membranaceous, oblong or tongue-shaped, repand or very sharply serrate, sometimes slightly laciniate, lowest ones narrowed at the base or contracted into a winged petiole; upper ones sessile, partly clasping by a sometimes dilated base; heads nodding on slender peduncles; involucre lax, calyculate; the golden rays linear, elongated, 1–2′ long; achenia perfectly glabrous."—Mountains of Colorado, (Parry! Hall & Harbour! Vasey!) Var. TARAXICOIDES, Gray, *l. c.* "Truly alpine; stems 4–5′ high, bearing single heads, which are smaller and less nodding; rays about half an inch long; leaves all narrowed at the base, more or less laciniate."—Bare alpine regions of the Colorado peaks, (Parry, 28!) Rocks below Clover Peak, Nevada; 10,000 feet elevation; September. Plants 5–7′ high, with much larger leaves than Parry's, and the rays very scantily developed. One form has laciniately-toothed leaves, (678,) and in another the leaves are entire, or at most obscurely denticulate. (679.)

PSATHYROTES[1] ANNUA, Gray. *Pl. Wright.* 2. 100; *Proc. Amer. Acad.* 7.

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[1] PSATHYROTES, GRAY, *l. c.* Heads many-flowered, the flowers all alike, perfect, fertile. Corollas cylindrical with a very short proper tube, 5-toothed, the teeth short and very obtuse, villous exteriorly. Involucre of two rows of scales as long as the disk. Receptacle naked, flat or convex. Anthers linear,

363. Scurfy-pubescent and mealy; leaves broadly triangular, the lower ones somewhat reniform, irregularly dentate, 3–6″ long and broad; heads axillary or subcorymbose, at length nodding; involucral scales in two rows, 5 outer subfoliaceous lanceolate and persistent, and 12–15 inner scarious 2–4-nerved deciduous ones; corolla very slender, the apex pubescent with a few long crisped webby hairs; achenia very villous, the hairs rather rigid and often slightly bifid at the extremity.—A low branching whitish herb, with the look of *Obione argentea.* New Mexico to California; Humboldt Plains, Nevada, (Torrey.) Carson Desert, and near Hot Springs in the Hot Spring Mountains, Nevada; 4–4,500 feet elevation; July, August. (680.)

TETRADYMIA[1] CANESCENS, DC. Densely white-tomentose; leaves linear, 6–12″ long and about 1″ wide, rigid, mucronate, but not spinescent, axillary fascicles of smaller leaves none; heads racemose-corymbed; involucre 5–6″ long, of 4 oblong obtuse carinate scales; florets 4; achenia sparingly villous with soft short hairs, soon becoming nearly smooth.—Shrubby, forming a densely branched bush 1–3° high, the main stem often 2′ thick at the base. The same habit is common to all the genus.—British Columbia, Oregon and California; Mt. Davidson, (Bloomer.) Virginia, Truckee and East Humboldt Mountains; 6–9,000 feet elevation; July, August. (681.)

Var. INERMIS, Gray. (*T. inermis*, Nutt.) Leaves shorter, acute, but scarcely mucronate; heads smaller; involucral scales 2–4″ long.—Southern Oregon to Wyoming, Colorado and New Mexico; Western Nevada, (Anderson, Bloomer.) Toyabe Range, Huntington and Ruby Valleys, Nevada, and Silver Creek Cañon, near Parley's Park, Utah, on dry hillsides; 6–7,000 feet elevation. (682.)

TETRADYMIA GLABRATA, T. & G. *Pac. R. R. Rep.* 2. 122, *t.* 5. Branches white-tomentose; leaves soon glabrate, somewhat fleshy; primary ones erect,

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the connective with an ovate acute point, and the cells slightly produced at the base. Style included, the branches short, stigmatic to the summit, and crowned with a very short truncate villous appendage. Achenia oblong or top-shaped, densely villous. Pappus of numerous unequal slightly scabrous rather rigid bristles, the longest half the length of the corolla.—Low heavy-scented annuals or biennials, viscid or mealy-pubescent, with alternate petioled leaves and yellow flowers. Natives of New Mexico, California, &c.

[1] TETRADYMIA, DC. Heads 4-flowered, (in one species 5–9-flowered;) the flowers all tubular, perfect and fertile; the corollas funnelform with a long slender tube, deeply 5-lobed, the linear lobes slightly recurved. Involucre of 4 (rarely 5–6) subequal concave-carinate rigid oblong scales. Receptacle very small, naked. Anthers linear, exserted. Branches of the style linear, with very short ovate obtuse pubescent appendages. Achenia oblong-linear, villous or glabrate. Pappus copious, of very fine unequal capillary denticulate filaments as long as the tube of the corolla.—Low much-branched shrubs, of Oregon, California, New Mexico, &c.; often densely white-tomentose, with small rigid linear or subulate sessile alternate leaves, the primary ones often becoming spiny. Heads rather large, solitary on short branchlets, or forming small terminal and subterminal clusters; flowers yellow.

3–5″ long, ⅓″ wide, linear-subulate, mucronate, producing the next year from their axils fascicled shorter obtuse ericoid leaves; heads corymbose; involucres of 4 whitish-pubescent or glabrate scales about 4″ long; florets 4; achenia villous, the hairs much shorter than the pappus.—Sierras of California, (Beckwith;) Carson City, (Anderson.) In the Pah-Ute range and Unionville and Monitor Valleys, Nevada, and Carrington Island, Great Salt Lake, on dry foot-hills; 5–5,500 feet elevation; June, July. This species is best distinguished by the very weak erect primary leaves, and the glabrate fascicled secondary ones. (683.)

Tetradymia Nuttallii, T. & G. White-tomentose; primary leaves spreading, rigid and spiny, 6″ long, bearing in their axils the next season fascicles of spatulate obtuse shorter and broader canescent-tomentose secondary ones; heads corymbose; involucral scales and flowers mostly 4, the former about 4″ long; achenia villous.—Plains of the Snake River, Idaho, and on Harris's Fork, Utah, (Nuttall!) Shore of Great Salt Lake, (Stansbury.) Stansbury Island; 4,500 feet elevation; June. (684.)

Tetradymia spinosa, H. & A. Branches, involucres and the recurved-spreading rather stout spiny primary leaves densely white-tomentose; secondary leaves fascicled, much smaller than the spines, linear, obtuse, fleshy, glabrous and ericoid; heads solitary or racemose, rather large; involucral scales 5–6; florets 5–9; achenia densely silky-villous, the denticulate hairs quite as long as the pappus.—Southern Idaho, (Tolmie, Nuttall! Burke!) Southern California, near Fort Mohave, (Dr. Cooper!) Truckee and Trinity Mountains, and Unionville Valley, Nevada; 4,500–5,000 feet elevation; May, June. (685.)

Cirsium undulatum, Spreng. Islands of Lake Huron to Oregon and California, and southward to Texas and New Mexico; Carson City, (Anderson;) Stansbury Island, (Stansbury.) Throughout Nevada and Utah; the commonest white-leaved thistle of the foot-hills and lower mountain-sides; 5–8,500 feet elevation; June–August. (686.)

Var. albescens. Flowers pale yellowish-white.—Shore of Stansbury Island; 4,300 feet elevation; June. (687.)

Cirsium foliosum, DC. (*C. edule*, Nutt.) Stem erect, branched toward the top, stout, striate, and somewhat woolly; leaves loosely webby on both surfaces, elongated, 6–11′ long, not over 1′ wide, irregularly sinuate-toothed, the teeth triangular, and the veinlets ending in strong stramineous spines;

heads large, "glomerate in the axils of the uppermost leaves," or peduncled; involucral scales linear-lanceolate, appressed, spine-tipped, arachnoid-tomentose; rays purplish.—This is not nearly so white a plant as *C. undulatum;* the leaves are much narrower and more prickly, and the involucre more arachnoid. The present specimens have naked long-peduncled heads, and in this respect differ from the type as originally characterized. Mountains of British Columbia to Oregon and Idaho. Colorado, (Parry 34, Hall & Harbour 340, and 341, white-flowered.) From the West to the East Humboldt Mountains, Nevada; 5,500–7,000 feet elevation; June, July. (688.)

Cirsium Coulteri, Harvey & Gray. *Pl. Fendl.* 110. "Webby-tomentose; stem branching; stem-leaves oblong-lanceolate, partly clasping, loosely webby above, the edges wavy or sinuate; heads very large, solitary, not bracted at the base; involucre exceedingly arachnoid-woolly, the scales loosely imbricated, straight, at length spreading, all of them oblong or lanceolate from a short base, gradually narrowed into a long cuspidate needle-like point.—Heads nearly 2′ broad; flowers deep crimson; leaves much like those of *C. undulatum*, but not so deeply lobed. California, (Coulter, Brewer! Bridges, 268!) Carson City, Nevada, (Anderson!)

Cirsium Drummondii, T. & G. Stemless, or with simple stems 1–2° high, glabrous or very sparingly and deciduously webby; leaves green and smooth above, paler and sometimes slightly webby beneath; radical ones oblanceolate or spatulate, the primary ones entire with ciliate-spinulose margins, later ones and the stem-leaves pinnately toothed or incised, often doubly so, and spiny with weak slender prickles; heads 1–4, sessile or short-stalked, surrounded either by the radical leaves or by a circle of leaves at the top of the stem; involucres glabrous, the scales triangular-lanceolate, appressed, tipped with weak prickles; flowers "red" or purplish.—There are two forms, differing only in the presence or lack of a stem, and even in this respect they pass into each other. (*a.*) The caulescent form. Saskatchewan and Rocky Mountains of British America; Colorado, (Hall & Harbour, 343.) Humboldt Valley, meadows in the Toyabe Mountains, and in Bear River Cañon; 5–8,000 feet elevation. (689.) (*b.*) The acaulescent form; (*C. acaule,* Var. *Americanum,* Gray. *Proc. Acad. Phil.*, March, 1863, *p.* 68.) Colorado (Hall & Harbour, 339! Vasey, 349!) to California (Brewer!) and Oregon (Kronkhite!) Carson City, Nevada, (Anderson, 91!) Ruby and Thousand

Spring Valleys, Nevada, and Bear River Cañon; 6–8,000 feet elevation; July–September. (690.)

CIRSIUM ERIOCEPHALUM, Gray. *Proc. Acad. Phil.*, March, 1863, *p.* 69. Stem 1–2° high, simple, leafy, deciduously arachnoid-tomentose; leaves nearly smooth above, paler and webby beneath, far decurrent, linear, pinnatifid with very numerous and crowded short very spiny lobes; heads several, sessile in a dense terminal cluster, involucrate with very spiny foliaceous bracts, which pass gradually into spinulose-ciliate spine-tipped involucral scales; innermost scales entire, spine-tipped; flowers yellow.—Alpine regions of the peaks of Colorado, (Parry, Hall & Harbour, Vasey 348.) Var. LEIOCEPHALUM. Leaves smooth on both sides; heads very prickly, but entire destitute of wool or pubescence; otherwise as in the type.—An intermediate form was collected in Colorado by Hall & Harbour. Cottonwood Cañon, Wahsatch, and in the Uintas on a high divide at the head of Bear River; 8–10,500 feet elevation; July, August. (691.)

CALAIS[1] LINEARIFOLIA, DC. Scapes simple, 5–14′ high; leaves at first softly pubescent and ciliate, linear-acuminate, entire or laciniately pinnatifid with a few linear lobes; involucre of 9–12 unequal smooth lanceolate scales; achenia 5″ long, linear-fusiform, short-beaked; scales of the pappus 5, linear-lanceolate, equaling the achenium, the apex bifid, and the midrib produced into a slender awn much shorter than the scale.—California to New Mexico and Chihuahua. Washoe Valley, Trinity and East Humboldt Mountains, Nevada, and Stansbury Island; 4–5,000 feet elevation; May, June. (692.)

CALAIS MACROCHÆTA, Gray. (?) *Pl. Fendl.* 112. A single small immature plant, perhaps of this species, was collected in the Trinity Mountains on granite rocks. The species may be known by the short oblong bifid pappus-scales, with an awn at least three times longer than the scale; the general habit much as in the last. (693.)

CALAIS NUTANS, Gray. *Pac. R. R. Reports*, 4. 113. (*Ptilophora nutans*, Gray. *Pl. Fendl.* 113.) Glabrous, very slender; stems 6–18′ high, simple or branching; leaves narrowly linear, acuminate, entire or with a few subulate spreading lobes; involucre cylindrical, 8–20-flowered, calyculate; outer bract-

[1] CALAIS, DC. "Heads many- (rarely few-) flowered; (the flowers all ligulate.) Involucre cylindraceous or campanulate, either simple and calyculated [bracteolate] at the base, or imbricated with the scales in a few rows. Receptacle flat, naked. Achenia terete, 12–14-striate, beakless or attenuated upward and beaked. Pappus simple, of 5–10 or 14–22 scarious awned scales, the awns scabrous, barbellate or plumose.—Herbs of Northwestern America, with long naked monocephalous scapes or branches, and yellow flowers." GRAY, *Pac. R. R. Reports*, 4. 112.

eoles 4–5; proper involucral scales 4–7″ long, lanceolate-acuminate, about 8, in two rows; achenia roughish-pubescent, 2–3″ long, scarcely rostrate; pappus of 12–20 elegantly plumose setæ, rising from an entire oblong scarious base 4–5 times shorter than the plume.—Washington Territory and Oregon to California. Havallah and East Humboldt Mountains, Nevada, and near Salt Lake City and in the Wahsatch, usually along stream banks; 4,500–9,000 feet elevation; May–September. (694.)

Var. LATIFOLIA has oblong-spatulate entire leaves, 2–4′ long, 6–9″ wide. —With the other form, East Humboldt Mountains and the Wahsatch. (695.)

CALAIS MAJOR, Gray, *l. c.* Glabrous; stem stouter, 1–2° high; petioles with a dilated base; leaves 6–8′ long, 4–9″ wide, lanceolate-spatulate, entire or laciniated; involucre puberulent or glabrate, campanulate, many-flowered, bractlets 8 or 9, proper scales 10–13, acuminate; achenia and pappus nearly as in the last, of which it is probably only a larger form.—Oregon. Antelope Island, and near Salt Lake City, in meadows; 4,300 feet altitude; May, June. (696.)

ANISOCOMA[1] ACAULIS, Gray. *Boston Jour. Nat. Hist.*, 5. 111, *t.* 13. California, near Fort Mohave, (Dr. Cooper!) and near Fort Tejon, (Dr. Van Horn!) Carson City, Nevada, Anderson!) Foot-hills near Carson City, and near Steamboat-Springs, Washoe Valley, Nevada; 4,500 feet elevation; April, May. Dr. Gray has described the inner pappus as consisting of 5 longer and 5 alternate shorter setæ, all plumose above the middle, but the number of setæ seems to be variable, and the smallest ones, while scarcely at all plumose, are irregularly placed among the rest. (697.)

STEPHANOMERIA[2] MINOR, Nutt., (including *S. runcinata*, Nutt.) Perennial,

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[1] ANISOCOMA, GRAY, *l. c.* Heads many-flowered; the flowers all ligulate. Involucre sub-cylindrical; the scales 18–24, imbricated, purplish with broad scarious margins, the outer ones roundish or ovate, very short, inner ones linear-oblong. Receptacle flat, bearing a few very slender chaffy scales among the outer florets. Achenia slenderly obconic, 10–12-striate, pilose along the striæ, crowned with a persistent wavy-margined cup-like outer pappus, and bearing inside of this 10–15 deciduous setæ, some of them short and naked, and the other two-thirds as long as the corolla and exceedingly plumose nearly to the base.—An annual herb; the leaves all radical, 1–2′ long, at first tomentose, soon glabrous, pinnately lobed; the lobes short and somewhat denticulate; scapes simple, 2–6′ high, naked, monocephalous; heads an inch long; flowers yellow; pappus pure white.

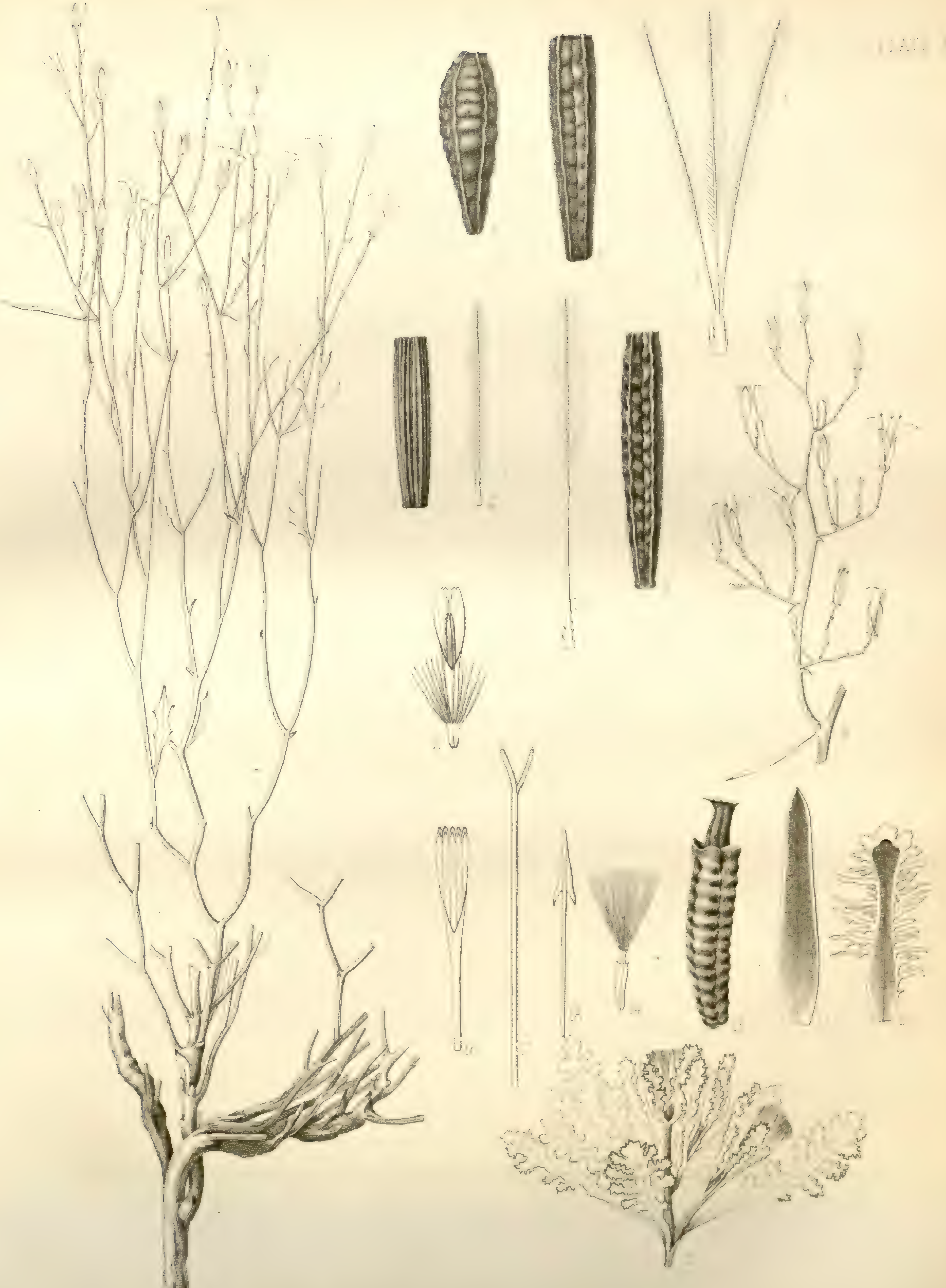
[2] STEPHANOMERIA, NUTT. (Including *Hemiptilium*, Gray.) Heads 3–12-flowered; the flowers all ligulate. Involucre cylindrical, calyculate; bractlets few, very small; proper scales 3–7, subequal, but in two species more numerous, unequal and imbricated. Receptacle naked, slightly honey-combed. Achenia oblong-linear or clavate-oblong, with 5 prominent angles or ribs, the intercostal spaces either plane or tuberculate-rugose, or occupied by additional less elevated ridges. Pappus simple, of 5–25 plumose filiform setæ or bristles, slightly dilated at the base.—Annual or perennial herbs, much branched, natives of Western North America from the great plains to the Pacific. Lower leaves linear, often runcinately toothed; the upper ones gradually reduced to small subulate bracts. Heads small; flowers rose-color.

glabrous; stems single, much branched, lower leaves 2–3′ long, runcinately toothed, upper ones reduced to subulate entire or 2–4-toothed bracts; heads 5–7-flowered, solitary on the ends of the branchlets; proper involucral scales 5–7, 4–5″ long; achenia 5-costate, smooth; pappus of about 15 distinct setæ, plumose nearly or quite to the base.—Oregon and California to Arizona, New Mexico and Colorado; Carrington Island, Great Salt Lake, (Stansbury.) Near Humboldt Lake, Nevada, (W. W. Bailey,) and on a ridge in Bear River Valley, near Evanston, Utah; 4–6,000 feet elevation; July, August. (698.)

STEPHANOMERIA MYRIOCLADA. Caudex woody, bearing innumerable densely crowded slender branching stems 8–12′ long; primary leaves not seen, those of the branchlets linear-spatulate, acute, entire or runcinately toothed, passing into subulate bracts; heads terminal on slender branchlets, 3-flowered, 2½–3″ long; scales of the slender involucre 3, bristles as many; achenia oblong-linear, 5-angled and with two less prominent striæ on each face, not tubercled; pappus of 14–17 distinct setæ, plumose to the base.—Plant forming a dense hemispherical tuft about a foot high, the branches irregularly dichotomous. On dry rocky ridges in Thousand Spring and Goose Creek Valleys, Nevada; 6–6,500 feet elevation; September. PLATE XX. Fig 1. Portion of a plant; natural size. Fig. 2. A flower; magnified four diameters. Figs. 3 and 4. Mature achenium and seta; magnified twelve diameters. (699.)

STEPHANOMERIA PANICULATA, Nutt. Annual, glabrous; stem 2–3° high, erect, striate; cauline leaves linear, 2–3′ long, 1″ wide, entire, or the lower ones with a few small teeth near the base; heads 3″ long, 5–7-flowered, nearly sessile along the straight diverging paniculate branches; involucre of 5–8 scales and several minute bractlets; achenia oblong-clavate, slightly one-sided, rugose-tuberculate between the 5 longitudinal undulate ridges; pappus of about 25 slightly unequal distinct setæ, plumose to the base.—Colorado to California. West Humboldt Mountains, Nevada, and on Promontory Point, and near Salt Lake City, Utah; 4,300–5,000 feet elevation; May–September. PLATE XX. Fig. 5. Mature achenium; magnified twelve diameters; the tubercles are sometimes more decidedly in a double row between the ridges. (700.)

STEPHANOMERIA EXIGUA, Nutt.! (*Hemiptilium Bigelovii*, Gray! *Bot. Mex. Boundary*, 105.) Annual, glabrous; stems 1–2° high, diffusely much branched, the branches very slender; lower leaves linear, with a few subulate



teeth towards the base; upper ones smaller and passing into subulate bracts, (always?) auriculate with 2 minute teeth; heads peduncled, irregularly corymbose-paniculate, 3″ long, 3–9-flowered; involucre as in the last; achenia linear, straight, slightly enlarging upward, strongly 5-angled and with a double row of tubercles between the angles; pappus usually of 15 setæ, plumose from near or below the middle to the top, 3 from each angle of the achenium, with their slightly dilated bases commonly united.—The setæ are sometimes plumose for the greater part of their length, and the dilation at their base is scarcely greater than in *S. paniculata*, which has, moreover, quite as rugose and tubercled an achenium; it seems, therefore, advisable to merge *Hemiptilium* into *Stephanomeria*. California to Colorado and New Mexico; Virginia City, (Bloomer.) Foot-hills throughout Nevada, and on Carrington Island, Great Salt Lake; 4,500–6,000 feet elevation; June–August. PLATE XX. Figs. 6 and 7. Achenium and three united bristles of the pappus; magnified twelve diameters. (701.)

STEPHANOMERIA PENTACHÆTA. Annual (?); stem 1° high, perfectly glabrous, and whitish, diffusely branching; leaves linear-subulate, auriculate with small teeth, or the larger ones runcinately toothed, the uppermost minute and bractlike; heads 5-flowered, peduncled, panicled, 3–4″ long; involucre of 5 scales, besides 4–5 bractlets; achenia linear-oblong, 5-costate, with a double row of tubercles between the costæ; setæ of the pappus 5, one at each angle of the achenium, rather longer than the achenium, slightly dilated and setulose at the base, the upper half plumose.—Truckee and Humboldt Valleys; 4,500 feet elevation; September. PLATE XX. Fig. 8. A small branch; natural size. Figs. 9 and 10. Achenium and seta; magnified twelve diameters. (702.)

HIERACIUM SCOULERI, Hook. Stems 1–3° high, hispid and almost shaggy with coarse spreading hairs, (3–4″ long,) leafy; lower leaves 5–8′ long, 9–12″ wide, oblanceolate, mostly acute, sessile or nearly so; upper ones usually few and smaller; heads 6′ long, in a somewhat rounded panicle; peduncles erect; involucre calyculate or somewhat imbricated, glandular-puberulent and sparsely hairy; flowers yellow, about 20; achenia not narrowed at the summit.—A coarse plant, in appearance between *H. Gronovii* and *H. longipilum*. The stem is leafy in some specimens, in others nearly naked. Nutka to Oregon. Goose-Creek Mountains, and in the cañons of

the Wahsatch near Parley's Park; 6,500–7,000 feet elevation; July–September. (703.)

HIERACIUM ALBIFLORUM, Hook. Stems 1–3° high, rather slender, smooth above, hispid near the base, like the petioles and midribs, with rather long deflexed hairs; leaves mostly radical or low on the stem, oblong-lanceolate, acute, entire or denticulate; heads rather small, on nearly smooth bracteolate pedicels, in a compound at length very open corymb; involucre nearly ecalyculate, the blackish scales sparsely hairy; flowers white, about 20; achenia very slightly narrowed toward the summit.—Rocky Mountains of British America to Oregon and California, and eastward to Colorado; Carson City, (Anderson.) Cottonwood Cañon in the Wahsatch, and Bear River Cañon, Uintas; 7–8,000 feet elevation; July, August. (704.)

HIERACIUM TRISTE, Willd. Stem slender, simple, 6–15′ high, smooth below, hispid with blackish-fuscous hair above; leaves chiefly radical, hirsutulous or smooth, entire or remotely denticulate, tapering into slender petioles; heads few in a simple raceme or corymb; involucres hispid with blackish hairs; flowers 20–40; achenia oblong, not tapering to the summit.—Unalaska, and in the Rocky Monntains of Northern British America, to California and the Mountains of Colorado. Ridges of the Uintas, above Bear River Cañon, at 9–10,000 feet elevation; August. (705.)

LYGODESMIA JUNCEA, Don. From the Saskatchewan along the mountains to New Mexico and Texas, and eastward to Wisconsin. Gravelly slopes of Unionville Valley, Nevada; 5,000 feet elevation; June. Flowers light-pink; the ordinary form, with the leaves very slender, not over 2′ long, and the involucre 6″ long. (706.)

Var. DIANTHOPSIS. (*L. juncea*, Dur. *Bot. Utah.*, 169.) Involucre 9–11″ long; ligules exserted quite as much, 3″ wide; leaves rather stout, 2–4″ long.—Islands of Great Salt Lake, and gravelly slopes near the city; May, June. Collected also by Stansbury, by Mrs. Carrington, and by Frémont in his second expedition. Heads very much resembling a single-flowered carnation, and the leaves also are not dissimilar. (707.)

LYGODESMIA SPINOSA, Nutt. Stems 8–14′ high, several from a woody base, bearing many short divergent very rigid and spine-like branches; radical and lower leaves linear, 2–3′ long, the former with tufts of matted wool in their axils, the wool afterward enveloping the base of the stem; upper leaves reduced to minute subulate bracts; heads usually solitary on the ends

of the upper branchlets; involucre 4″ long, of 5–7 unequal lanceolate acute imbricated scales, with 2–3 minute calyculate bractlets; flowers 3–5, the ligules twice as long as the involucre; achenia not tapering upward; pappus rather rigid, 2½″ long.—"In the Rocky Mountain plains towards California," (Nuttall;) California, (Brewer;) Mount Davidson, Nevada, (Bloomer.) Foot-hills and gravelly hillsides, East Humboldt Mountains, Ruby Valley, and at the head of Humboldt River; 6,000 feet elevation; August, September. Flowers almost always three. The lower leaves are apparently membranous or grass-like, as they quickly perish, leaving only vestiges hidden in the peculiar masses of brownish-white wool. (708.)

MALACOTHRIX[1] CALIFORNICA, DC. Annual, villous-lanate or becoming smooth; stems several, 8–12′ high, scapiform and monocephalous or with 1–2 smaller heads from the axils of cauline leaves; radical leaves numerous, 3–6′ long, sometimes entire, but usually pinnately divided into 5–9 distant very narrow almost filiform entire segments; involucre campanulate, of many unequal lanceolate scales imbricated in several rows; flowers yellow, very numerous; achenia scabrellate on the primary ridges; outer pappus cup-like, with a hyaline and slightly pectinate border, two of the teeth developed into strong awn-like setæ, as long as the 12–15 nearly smooth deciduous capillary bristles of the inner pappus.—Heads as large as a dandelion or even larger, the ligules 4–5-toothed. The two outer setæ of the pappus are not opposite, but both on one side of the achenium, and the same arrangement is seen in *M. Coulteri*. California, (Douglas, Brewer!) Var. GLABRATA, Gray, Ms. Glabrous throughout, even when young.—Carson City, (Anderson!) Foot-hills of the Trinity Mountains, Nevada; 4,500 feet elevation. (709.)

MALACOTHRIX SONCHOIDES, T. & G. Annual, glabrous; stems 4–15′ high, corymbosely branching; leaves oblong-lanceolate; runcinately pinnatifid; the lobes ovate-lanceolate, acute, toothed or nearly entire; heads large, (9–14″ wide,) terminal on the branches; involucre bell-shaped, with a few outer calyculate scales, but mostly of lanceolate acuminate white-margined subequal entire scales, 4–6″ long; achenia many-striate, smooth; outer

[1] MALACOTHRIX, DC. Heads many-flowered; the flowers all ligulate. Involucre hemispherical or bell-shaped, of numerous narrow imbricated scales. Receptacle naked. Achenia oblong-linear, not beaked, smooth, 8–15-striate or ridged. Pappus double; the outer a minute cup-like crenulate or toothed ring, a few of the teeth sometimes produced into awn-like somewhat persistent setæ; the inner composed of many silvery-white capillary minutely-serrulate or barbellate deciduous bristles.—Herbs, annual or perennial, natives of Western North America. Leaves undivided or pinnatifid. Flowers yellow or white

pappus of five strong awns and about ten very short intermediate teeth; inner pappus of about fifteen capillary bristles, deciduous in a ring.—In this and other allied species of *Malacothrix* the stronger bristles of the pappus certainly belong to the cup-like crown, and not to the deciduous pappus, as was supposed by Drs. Torrey and Gray. (See *Stansb. Rep.* 392; *Pl. Fendl.* 113; *Pl. Wright.* 2. 105.) From Nebraska (Nuttall) to the shores and islands of Great Salt Lake (Stansbury) and Oregon, (Geyer;) Carson City, (67 Anderson.) Foot-hills and gravelly slopes throughout Nevada; 4,000–6,000 feet elevation; May–July. (710.)

Malacothrix obtusa, Benth. *Plant. Hartw.* 321. Annual, erect, branching, 2–12′ high; leaves at first whitish-woolly above, soon nearly or quite glabrous; the radical ones 2–3′ long, runcinate-pinnatifid with obtuse dentate lobes; stem-leaves linear, toothed or entire; heads small, 5–7″ wide; involucre bell-shaped, calyculate, the inner scales subequal, oblong-linear, white-margined, 3″ long; flowers yellow or whitish; achenia 5-costate and with intermediate pairs of smaller ridges; outer pappus cup-like, obtusely about 24-toothed, without awns; inner pappus rather coarse, very scabrous, deciduous.—Near the last, but with much smaller heads, and no persistent bristles of the outer pappus. California, (Hartweg, Parry, Brewer!) Stansbury Island, Great Salt Lake; 4,300 feet elevation; June. (711.)

Crepis[1] runcinata, T. & G. Perennial, hirsute or becoming nearly smooth; radical leaves oblong or obovate, runcinate-lobed or only slightly toothed; scape 1–2° high, branching, bearing a few linear bract-like leaves; branches and involucres more or less hirsute with blackish often glandular hairs; involucres many-flowered, calyculate, the scales linear-lanceolate, with scarious margins; achenia slightly tapering upward, striate.—Saskatchewan to Nebraska and Colorado; Oregon, (Geyer.) Meadows and wet places near Salt Lake City, and in the Wahsatch and Uintas; 4,300–7,000 feet elevation; May–July. The present specimens are much larger than those from Colorado, and are much more blackish-hirsute on the peduncles and involucres. (712.)

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[1] Crepis, L. Heads several-many-flowered; the flowers all ligulate. Involucre usually calyculate with a few small bracteoles, the proper scales nearly equal, in a single series. Receptacle naked or slightly hairy. Achenia terete or somewhat compressed, 8–30-striate, usually narrower above or even tapering into a short beak, the apex expanded into a minute disk. Pappus pure white, copious, of denticulate or scabrous delicate capillary bristles, or sometimes of more rigid bristles slightly dilated toward the base.—Annual, biennial, or perennial herbs, natives of Europe, Asia, and Northwestern America, commonly with very variable runcinate-pinnatifid or dentate leaves, and yellow flowers.

CREPIS GLAUCA, T. & G. Perennial, smooth and somewhat glaucous; leaves all radical, linear-spatulate, tapering into a short-winged petiole, apiculate, nearly entire and deeply runcinate on the same plant; stems 1–2° high, with small linear bracts at the base of the 2–3 slender peduncles; involucres many-flowered, smooth, slightly calyculate, the proper scales linear-lanceolate, scarious-margined; achenia smooth, 8–10-ridged, slightly tapering upward.—Heads smaller than in the last, the smoother forms of which it approaches perhaps too closely. Plains of Nebraska to Oregon, (Geyer.) Ruby Valley, Nevada, and on the foot-hills near Salt Lake City; 4,500–6,000 feet elevation; May–July. (713.)

CREPIS ANDERSONII, Gray. Perennial, 1–2° high; leaves linear-spatulate or oblong-lanceolate, slightly toothed, runcinate or laciniate-pinnatifid, glabrous, like the sparingly branched and leafless scapes; bracts at the base of the mostly monocephalous branches small and linear; involucre of sparingly puberulent herbaceous lanceolate unequal scales, imbricated in 2–3 rows, many-flowered; achenia smooth, angled and many-ridged, fusiform and tapering into a short beak.—In habit much like the last, but with a well-marked imbricated involucre. Carson City, Nevada, (305 Anderson!) Hot springs in Grass Valley and Reese Valley, Nevada; 4,500–5,000 feet elevation; June, July. (714.)

CREPIS OCCIDENTALIS, Nutt. Perennial, canescent and scurfy-tomentose; stems 6–18′ high, branching, leafy; radical leaves with the petioles 6–9′ long, lanceolate, tapering both ways, acuminate, more or less deeply runcinate-pinnatifid, with acute often toothed lobes; cauline leaves similar, but smaller and sessile; heads corymbed, 11–35-flowered; involucres calyculate with a few loose bractlets, the proper scales 8–10, 6–8″ long; mature achenia rather stout, 3″ long, tapering to the apex, evidently 10-striate.—This species varies greatly in size, shape of leaves, and number of flowers in a head, but it has larger and looser calyculate bractlets than the next, and a canescent or sometimes hispidulous involucre, and a greater number of flowers in a head. Oregon and California to Nevada, Utah, and Colorado; Carson City, (Anderson;) Salt Lake City, (Mrs. Carrington.) From Western Nevada to the Wahsatch, and on the shore of Stansbury Island; 4,300–8,000 feet elevation; May–July. (715.)

Var. GRACILIS. (*C. acuminata*, Var. *gracilis*, Torrey, Ms.) Stem very slender, bearing 3–6 narrow 9–14-flowered heads; leaves narrowly linear,

long-acuminate, with a few very narrow almost filiform elongated teeth near the middle.—Middle Park, Colorado, (Parry, 1864.) Cañons of the East Humboldt Mountains and on a peak west of Parley's Park in the Wahsatch; 7–9,000 feet elevation; July–September. (716.)

CREPIS ACUMINATA, Nutt. Torrey, *in Stansb. Rep.* 392, *t.* 8. Perennial; stem sparingly canescent, 1–3° high; leaves pubescent, the radical ones lanceolate, long-acuminate, 6–9′ long, tapering into a petiole often two-thirds as long, laciniately pinnatifid into numerous linear-lanceolate spreading or curved usually entire teeth; cauline leaves few, mostly sessile, the lower similar to the radical, the upper linear, entire; heads 5–7-flowered, very numerous in a compound fastigiate corymb; involucres glabrous or nearly so, cylindrical, calyculate with a few ovate appressed bractlets; the proper scales 6–7, about 5″ long; mature achenia tapering slightly upward, 10-striate.—The figure in Stansbury's Report shows a plant with the foliage more like that of *C. occidentalis*, and achenia more decidedly beaked than either species affords among the numerous specimens now examined, though it correctly represents the very numerous slender heads of *C. acuminata*. Oregon and California to Colorado and Nebraska; Mt. Davidson, (Bloomer!) Stansbury Island, (Stansbury.) Hill-sides from Western Nevada to the Uintas; 5–7,000 feet elevation; May–July. (717.)

TROXIMON CUSPIDATUM, Pursh. Northern Illinois and Wisconsin to Oregon, (Spaulding!) Valley of Great Salt Lake, (Stansbury.)

MACRORRHYNCHUS[1] GLAUCUS. (*Troximon glaucum*, Nutt.) Perennial, smooth and somewhat glaucous; leaves linear-lanceolate or lanceolate, 3–6′ long, about 6″ broad, entire or slightly runcinate-toothed; scapes 6–9′ high; involucral scales unequal, the outer ones shorter and broadly ovate-lanceolate, slightly pubescent; inner ones lanceolate, 7–9″ long; achenia 10-ribbed, contracted toward the summit, but scarcely beaked; pappus rather coarse, longer than the achenium.—Saskatchewan to Nebraska and Colorado, (65 Parry, 354 Hall & Harbour, in part, 260 Vasey?) Var. LACINIATUS. "Leaves

[1] MACRORRHYNCHUS, LESSING. Heads many-flowered, the flowers all ligulate. Involucre campanulate; the lanceolate or ovate-lanceolate scales imbricated in 2–3-series, the inner ones scarious-margined, the outer ones sometimes shorter, often foliaceous. Receptacle naked, or very rarely with a few chaffy scales among the flowers. Achenia glabrous, terete or slightly obcompressed, 10-ribbed or winged, narrowed above and in most species at length produced into a long slender beak, the apex dilated into a small flat disk. Pappus of copious white scarcely scabrous soft and capillary or coarser and somewhat rigid bristles.—Annual or perennial herbs of Western America, North and South, nearly or quite acaulescent, with rather large heads solitary on long naked scapes, and entire or laciniate-pinnatifid often elongated leaves; flowers yellow, rose-color, or purplish.

dilated, laciniate-pinnatifid, segments lanceolate-attenuate." Gray, *Proc. Acad. Philad.*, Mar. 1863, *p.* 69.—Flowers yellow or orange, turning purplish when dried. Leaves varying from narrowly linear to broadly lanceolate in outline, but always more or less laciniate. None of the specimens have ripened achenia, but the most advanced show a very short beak, one-fourth as long as the achenium. This species and the next agree very closely in foliage, size of head, color of flowers, both fresh and dried, in the young achenia and in the nature of the pappus; even the "long jointed hairs" at the summit of the tube of the corolla are alike in both; so that the involucre, of unequal scales in one species and equal in the other, and the longer or shorter beak of the mature achenium, seem to be the only remaining points of distinction. When both species shall be studied from the living plant with ripened achenia it is quite possible that even these differences will disappear. Colorado, (354 Hall & Harbour, in part.) From the foot-hills near Carson City to the Uintas; 5–7,500 feet elevation; May–September. (718.)

424 Parry, 356 Hall & Harbour, and 361 Vasey belong to Var. *dasycephalus*, T. & G. "Involucre woolly, at least when young, the exterior scales spreading; leaves and scape often somewhat pubescent; receptacle sometimes, but not always, furnished with a few linear-acuminate chaffy scales intermixed among the flowers."—Arctic America to Oregon and Colorado.

Macrorrhynchus troximoides, T. & G. Perennial, smooth and somewhat glaucous; leaves 4–10′ long, 3–9″ wide, linear-lanceolate or linear-spatulate, acuminate or obtuse and slightly apiculate, entire or laciniately pinnatifid; scapes 4′–2° high; involucre 6–10″ long, the scales nearly equal, lanceolate from a broad base; achenia 10-ribbed, at first shorter than the pappus and scarcely beaked, at length produced into a slender beak two-thirds as long as the achenium proper, and with it slightly or considerably longer than the pappus.—Flowers orange-color, fading to purplish. The pappus is variable in fineness, one of the best-marked specimens, with rostrate achenia, having rather coarse and evidently flattened bristles. To this species Dr. Gray has already referred *Troximon roseum* and *T. parviflorum*, and it is not at all improbable that *T. glaucum* will eventually follow them. Mountains of Colorado, (66 & 67 Parry, 355 Hall & Harbour, 359 Vasey,) to California, Oregon, and British America; Virginia City, (Bloomer.)

Cañons and banks of creeks from Western Nevada to the Uintas; 4,500–10,000 feet elevation; June–September. (719.)

Macrorrhynchus grandiflorus, T. & G. Perennial, slightly webby-pubescent throughout; leaves 5–15′ long, linear-lanceolate, runcinately toothed or laciniate with long acuminate teeth; scapes 1–2° high; heads very large; outer involucral scales foliaceous, broadly ovate-oblong, ciliate-pubescent; the inner ones narrower and with slightly scarious margins; achenia strongly 10-ribbed, one-fourth the length of the very slender beak, and half as long as the white soft capillary pappus.—Oregon and California. Foot-hills near Salt Lake City; 4,500 feet elevation; May. (720.)

Macrorrhynchus hetrophyllus, Nutt. Annual, pubescent, often somewhat caulescent; leaves 2–5′ long, linear-spatulate; the earlier ones entire or slightly toothed; later ones commonly laciniate with a few short acute teeth; scapes 4–9′ high; involucral scales imbricated in about 3 rows; the outer ones somewhat hairy and shorter than the smooth oblong-lanceolate inner ones; achenia fusiform, with ten corky or winged often undulate ribs; the filiform beak 3–4 times longer than the body of the achenium, and considerably longer than the very delicate pappus.—The present specimens have considerably longer achenia and pappus than those collected in California by Brewer, and while the ribs of the achenia are rounded and corky they show nothing of the undulation so strongly insisted upon by Nuttall. Oregon and California. West Humboldt Mountains, Nevada, on the hills about Salt Lake City, and on Antelope Island, Utah; 4,500–5,500 feet elevation; May, June. (721.)

Taraxacum Dens-leonis, Desf. Common throughout the Northern States and "sparingly naturalized" in the Southern, (Chapman.) Arctic America, and along both sides of the Rocky Mountains, (Hooker,) to Colorado, ("truly indigenous," Hall & Harbour.) Prof. Brewer states that he has never seen it in California. The dandelion is named by Josselyn in 1672 in a list "of such plants as have sprung up since the English planted and kept cattle in New England." Europe, Western Asia, and Northern Africa. City Creek Cañon in the Wahsatch, and in the meadows of Salt Lake Valley; probably introduced. (722.)

Taraxacum palustre, DC. Very smooth; leaves lanceolate or oblong-spatulate, entire, sinuate, or slightly runcinate, usually shorter than the scape; "scales of the involucre not corniculate," the outer ones lanceolate,

appressed; achenia muricate and spinulose toward the apex, when mature shorter than the beak.—The specimens now collected have leaves 3–4′ long and 5–6″ wide, slightly toothed and very obtuse. The involucral scales are certainly corniculate, as they are also in Hall & Harbour's plant:—no European specimens are at hand for comparison. Arctic America and Labrador to Alaska; Colorado, (357 Hall & Harbour;) Greenland, Europe, and Northern Asia. Uintas, on a peak at the head of Bear River; 12,000 feet altitude; August. (723.)

TARAXACUM PHYMATOCARPUM, J. Vahl. Dwarf, glabrous; leaves 1–2′ long, lanceolate, runcinate with rather short obtuse teeth, or nearly entire; scapes scarcely exceeding the leaves; heads very small, blackish; outer involucral scales short, spreading; inner ones 8–12, 3–4″ long, not corniculate, narrowly scarious-margined; flowers very short; mature achenia not seen.—Described from Greenland specimens sent from Copenhagen with the above name. The present specimen, a single one only, is rather larger than those from Greenland, but is plainly the same plant. It is assuredly not *T. lævigatum.* It must be noted that both *T. palustre* and *T. phymatocarpum* are considered forms of *T. Dens-leonis* by Dr. Hooker. Uintas, with the last, on a peak at the head of Bear River; 12,500 feet elevation; August. (724.)

GLYPTOPLEURA[1] MARGINATA.—Sandy Artemisia plain in Truckee Pass of the Virginia mountains, in a cañon of the Trinity Mountains, and in Unionville Valley, Nevada; 4–5,000 feet elevation; May, June. Also collected in 1870 at St. George in Southern Utah by Dr. Edward Palmer, a form with less developed outer involucral scales. PLATE XX. Fig. 11. A single branch; natural size. Fig. 12. Outer involucral scale or bract. Fig. 13. Inner involucral scale. Fig. 16. Corolla; each enlarged four diameters. Fig. 14. Achenium and pappus; enlarged two diameters. Fig. 15. Achenium. Fig. 17. Style. Fig. 18. Stamen; all enlarged eight diameters. (725.)

[1] GLYPTOPLEURA. Heads many-flowered; the flowers all ligulate. Involucre subcylindrical, composed of 7–12 equal oblong-lanceolate herbaceous white-margined entire scales, and of 4–8 outer spatulate or panduriform white-margined lacerate-fringed bracts, either nearly as long as the proper scales or reduced to calyculate bractlets. Receptacle flat, naked. Achenia obconic-oblong, with a scurfy-granulose whitish surface, obtusely 5-angled; the angles more or less transversely rugose, the sides furrowed and pitted, and the summit forming a shallow obscurely 5-toothed cup, from the interior of which rises a short 5-furrowed beak, its apex somewhat dilated and bearing a copious white capillary pappus deciduous in a ring.—A small annual or biennial branching prostrate herb, forming a dense flattened tuft 2–6′ in diameter; leaves somewhat fleshy, oblong, pinnatifid and laciniately denticulate with whitish scarious teeth; flowers purplish, terminal, nearly hidden by the leaves.

The affinities of this curious plant are with *Taraxacum*, *Chondrilla* and *Willemetia*, all of which have the achenium suddenly contracted into a beak; the two former have more or less roughened or muricated achenia, and the two latter a circle of teeth or a corona surrounding the base of the beak.

MULGEDIUM PULCHELLUM, Nutt. British America, Oregon and California, and eastward to Upper Michigan; Virginia City, (Bloomer.) From the Truckee River, Nevada, to Provo Valley, Utah; 4–6,000 feet elevation; July–September. (726.)

SONCHU ASPERS, Villars. Oregon and California to the Atlantic. "Probably indigenous to this country, at least to the South; now found in almost every part of the world." (*T. & G.*) Truckee bottom, cañons of the West Humboldt Mountains, Humboldt Valley, and City Creek Cañon in the Wahsatch; 4–6,000 feet elevation; May–September. (727.)

## LOBELIACEÆ.

DOWNINGIA[1] PULCHELLA, Torr. *Pac. R. R. Surv.* 4. 116. Stem 2–6′ long, branching, flexuous, ascending; leaves 3–12″ long, ovate and lanceolate, obtuse; sepals lanceolate, obtuse; upper lobes of the corolla ovate or lanceolate, acute, the middle lower lobe somewhat the longest; capsules becoming 2–3′ in length.—Corolla bright blue with a yellow or nearly white center, 2–6″ long. California and Oregon. Found in wet places in the Truckee Meadows, near Glendale, Nevada. July. (728.)

## CAMPANULACEÆ.

CAMPANULA ROTUNDIFOLIA, L. Stems 3–18′ in height; quite variable in the length and breadth of the calyx-segments, and the higher alpine form exactly like Greenland specimens of *C. linifolia*, Lam., which with *C. Langsdorffiana* is referred to this species by Dr. Hooker without doubt. In its various forms it occurs from Greenland and the Arctic Ocean to the Northern States and Washington Territory and southward in the Rocky Mountains to Colorado and New Mexico. In the Uintas on the dry rocky banks of Bear River at 8,000 feet altitude, and in wet ground near the summits at an elevation of 11,500 feet; July, August. (729.)

CAMPANULA UNIFLORA, L. *DC. Prodr.* 7. 482. Stem 1-flowered; leaves subentire, the lower obovate, petioled, the middle ones obovate-lanceolate, and the upper occasionally linear-lanceolate; calyx slightly villous, with linear acuminate lobes nearly equaling the funnelform corolla; capsule cylindrical.—

[1] DOWNINGIA, TORR. (*Clintonia*, Lindl.) Calyx-tube elongated; lobes 5, subequal, lanceolate. Corolla-tube very short, the limb bilabiate; lower lip cuneate, 3-lobed, the upper 2-parted with erect narrower lobes. Stamens united; lower anthers bearded at the apex. Ovary inferior, 1-celled, with 2 parietal placentæ. Capsule chartaceous, twisted, triangular, dehiscing by 3 linear valves, many-seeded.—Annual herbs, with entire sessile leaves and axillary sessile flowers longer than the bracts.

Stems 2–4′ high, with the deep-blue flowers often nearly twice longer than the calyx-lobes. As in the specimens from Colorado, the calyx-tube is wholly glabrous. Shores of the Arctic Ocean from Greenland to Behring Strait; Rocky Mountains of Colorado. In the Uintas, with the last; 11–12,000 feet altitude; August. (730.)

SPECULARIA PERFOLIATA, A. DC. Throughout the Eastern States from the Atlantic to the Mississippi; from Kansas to New Mexico and Western Texas, and in Washington Territory. Lower cañons of the Wahsatch, near Salt Lake City, at 5,000 feet altitude; May. (731.)

HETEROCODON[1] RARIFLORUM, Nutt. *Trans. Amer. Phil. Soc., n. s.,* 8. 255. Glabrous or more or less subaculeate-hispid; stems 2–12′ high, simple or branching at base, very slender and weak; leaves rather distant but somewhat in pairs, 3–6″ in diameter, sharply dentate, the margin slightly revolute; calyx-lobes ovate, dentate; the light-blue or white corolla 1″ long; capsule broadly ovate, bristly upon the angles.—From Washington Territory to the Sacramento; (5005 Bolander and 280 Torrey.) Havallah and East Humboldt Mountains, Nevada; 6,000 feet altitude; June–August. (732.)

## ERICACEÆ.

VACCINIUM ULIGINOSUM, L. Alpine peaks of the White Mountains and Northern New York; Newfoundland and Labrador, and from latitude 52° to the Arctic Ocean, Behring Strait and Greenland; Wind River Mountains, Wyoming, (Frémont.) Uinta Mountains; 6,000 feet altitude; August. (733.)

VACCINIUM CÆSPITOSUM, Mx. On the West Coast from Sitka to Washington Territory and eastward to the Saskatchewan, Hudson's Bay and Lake Superior; in the White Mountains, and in the Rocky Mountains of Colorado. Found in the Clover Mountains, Nevada, and in the Uintas; 8–10,000 feet altitude; August, September. (734.)

VACCINIUM MYRTILLOIDES, Mx. Newfoundland, and west of Hudson's Bay south of latitude 57° to Washington Territory, Colorado and Northern Michigan. Uintas; 9,000 feet altitude; July. (735.)

VACCINIUM MYRTILLUS, L. *DC. Prodr.* 7. 573. Branches sharply

[1] HETEROCODON, NUTT. Calyx-limb foliaceous, 5- (or 3-4-) parted. Corolla campanulate, 5-cleft, in the lower flowers none or minute. Stamens 5, included, the filaments free, shorter than the anthers. Stigmas 3, short. Capsule roundish, angled, membranous, 3-celled, bursting irregularly at the base. Seeds compressed, triangular, glabrous.—A slender annual, with alternate amplexicaul small rounded dentate leaves; flowers small, sessile, solitary, the upper ones only with a corolla.

angled, green; leaves ovate, serrate, very glabrous and shining; peduncles 1-flowered, solitary. Var. MICROPHYLLUM, Hook. Leaves 2–3″ long.—Stems 6′–1° high, very diffusely branched, from running rootstocks; the leaves are 2–6″ long and often rather narrowly oblong, acute at each end; flowers very small, scarcely 1″ in length, nearly white; fruit small, about 2″ in diameter, light red. Abundant in the Uintas, in the shade of pines at 8–9,000 feet altitude; in flower and fruit, July and August. Reported from Sitka and the Rocky Mountains of British America, (in latitude 52°,) Wyoming and Colorado. (736.)

ARCTOSTAPHYLOS UVA-URSI, Spreng. The ascending branches 4–6′ high, forming dense patches; the "Kinnikinnick" of the western Indians. From New Jersey and Wisconsin northward to the Arctic Ocean, while in the Rocky Mountains and westward it extends from latitude 63° to Northern California and Colorado; Council Grove, Kansas, (Abert.) Ruby and Huntington Valleys, Nevada, and frequent in the Uintas and in Bear River Valley; 6–8,000 feet altitude; in fruit, July–September. (737.)

ARCTOSTAPHYLOS GLAUCA, Lindl. *DC. Prodr.* 7. 586. Leaves glaucous, glabrous, ovate-oblong, entire, acute, coriaceous, very obtuse at base; racemes short, compound, with scalelike bracts; fruit ovate.—An evergreen branching shrub, 2–10° high, with red exfoliating bark; leaves vertical and alike upon both surfaces, 1–1½′ long; flowers light rose-color; fruit flattened, black, smooth, 3–4″ in diameter, filled with triangular rough stony seeds. The specimens from the Uintas (the most eastern locality in which it has been collected) are from a low form, but 2–3° high, somewhat pubescent, and with variable leaves, broadly ovate, oval or obovate upon the same branch, and subcordate or acute at base. They are distinguished from smooth forms of *A. tomentosa* by the perfectly glabrous fruit, but approach the *A. pungens* of the herbariums. The plant has, however, perfectly the habit, the smooth red bark and exceedingly crooked shrubby growth of *A. glauca*, without any resemblance whatever to *A. Uva-Ursi*, with which the "prostrate" *A. pungens* is compared. Oregon, California, Western Arizona, (Bigelow,) and in the Wahsatch, (Mrs. Carrington.) Washoe Mountains, Nevada, (in flower, April and May,) and in the Uintas; 6–9,000 feet altitude. (738.)

GAULTHERIA MYRSINITES, Hook. *Fl. Bor.-Amer.* 2. 35, *t.* 129. Low; branches cæspitose, rooting; leaves broadly ovate, ciliate-serrate; flowers solitary, with several ovate bracts, the subcampanulate corolla scarcely exceed-

ing the calyx; anthers obtuse; filaments glabrous; disk none.—Stems 2–6′ long, with numerous shining green leaves 4–9″ in diameter; flowers white, 1″ in length; fruit scarlet. Rocky Mountains of British America to latitude 57°, (Drummond,) and Colorado; Cascade Mountains, (Newberry.) Uinta Mountains; 8–9,000 feet altitude; August. (739.)

KALMIA GLAUCA, Ait., Var. MICROPHYLLA, Hook. Leaves somewhat oval, scarcely ½′ in length.—Leafy stems 1–2′ long, scarcely appearing above the grass on the turfy banks of alpine lakes; flowers 1–4, on 1′ long pedicels. The species extends from Pennsylvania northward to the Arctic Sea, and to Sitka and Oregon on the Western Coast; Rocky Mountains of Colorado. The variety is the usual Rocky Mountain form. East Humboldt and Clover Mountains, Nevada, and in the Uintas; 9–10,000 feet altitude; August, September. (740.)

LEDUM GLANDULOSUM, Nutt. *Trans. Amer. Phil. Soc., n. s.,* 8. 270. Branches rigid; leaves elliptical, entire, usually obtuse but mucronate, long-petioled, glabrous on both sides, paler and resinous-punctate beneath; capsules globose-ovate.—"Rocky Mountains," (Nuttall;) Northern California, (Bolander 4736, 6546.) Subalpine in the East Humboldt Mountains, Nevada, and in the Uintas; 9–10,000 feet altitude; August, in flower. As found in Nevada and Utah, it is a low branching evergreen shrub, about 2° in height, with leaves ½–1½′ long, on rather slender petioles 1–4″ in length, minutely reticulate-veined, the margin rarely at all revolute, sometimes pubescent upon the midvein and petiole, and with numerous yellow resinous dots beneath; calyx-lobes oblong, very obtuse, ciliate; flowers 4″ in diameter, dull white; stamens 4–10. Californian specimens have the leaves thicker and more revolute, with the flowers on shorter pedicels and more densely umbeled. (741.)

PYROLA ROTUNDIFOLIA, L., Var. INCARNATA, Hook. The species extends from the mountains of Georgia northward to New England and throughout British America to the Arctic Ocean, Greenland and Behring Strait; Northern California (Newberry) and Colorado. East Humboldt Mountains, Nevada, and in the Uintas; 6,500–7,000 feet altitude; July, August. The specimens are 8–18′ high, with leaves 2–2½′ in diameter, with elongated (4–6′) many-flowered racemes; the calyx-lobes are uniformly triangular-ovate, in this respect resembling the var. *uliginosa.* (742.)

PYROLA CHLORANTHA, Swartz. From New England to Pennsylvania and Wisconsin, and through British America to the Rocky Mountains and the

Arctic Circle; Northern California (Bigelow) and Colorado. A single specimen; Echo Cañon, in the Wahsatch; 6,000 feet altitude; July. (743.)

PYROLA SECUNDA, L. Northern States and through British America to the Arctic Circle and Pacific Ocean; Washington Territory and Colorado. Uinta Mountains; 7–8,000 feet altitude; July. (744.)

MONESES UNIFLORA, Gray. From Pennsylvania and New England northward, throughout British America to latitude 64°, and on the western coast from Sitka to Washington Territory; Colorado. Uinta Mountains; 9,000 feet altitude; July. (745.)

CHIMAPHILA UMBELLATA, Nutt. Mountains of North Carolina and through the Northern States and Canada and westward, to latitude 53°; on the western coast from Washington Territory to Northern California. Uinta Mountains, Utah; 8,000 feet altitude; July. (746.)

PTEROSPORA ANDROMEDEA, Nutt. Pennsylvania to Vermont; Canada; on the Saskatchewan; Washington Territory to Northern California; Colorado. Uinta Mountains; 8–9,000 feet altitude; August. Stems ½–3½° high; under pines. (747.)

## PLANTAGINACEÆ.

PLANTAGO ERIOPODA, Torr. *Ann. N. Y. Lyc.* 2. 237. Perennial; leaves fleshy, broadly lanceolate, 4–6′ long, 1–2′ wide, attenuate at each end, long-petioled, glabrous, entire, 5-nerved; base of the leaves and scape clothed with long dense brown wool; scape 1° high, terete, glabrous or pubescent, with a cylindrical spike (3–6′ long) of rather remote perfect flowers; bracts scarious-margined, ciliate; stamens and styles very long; bracts broadly ovate, mostly obtuse; capsules 4–5-seeded; seeds not hollowed.—Anticosti Island, (Pursh;) Red River Valley, Dakota, and northward to Bear Lake; valley of the Platte to the Rocky Mountains of Wyoming and Colorado. In clayey subalkaline soil in Ruby Valley, Nevada, and Bear River Valley; 6,000 feet altitude; July, August. (748.)

PLANTAGO BIGELOVII, Gray. *Pac. R. R. Surv.* 4. 117. Dwarf, 2–3′ high, annual, somewhat minutely hirsute or glabrous; leaves fleshy, 1–2½′ long, linear-filiform, obtuse, entire; spike short-oblong, densely 3–12-flowered; stamens 2; capsule oblong-ovoid, 3–4-seeded, longer than the calyx and the ovate acute bract.—Spike in the present specimens linear and rather loosely 10–30-flowered; style exserted, longer than the stamens; corolla-lobes ovate,

reflexed in fruit. Closely resembling *P. pusilla*, but with twice larger flowers and fruit, and the capsule (1″ or more in length) more protruded. Discovered by Bigelow at Benicia, California. Salt Lake Valley, near the mouth of Jordan River; June. (749.)

Plantago Patagonica, Jacq., Var. gnaphalioides, Gray. From Texas to Sonora and California, northward to Western Wisconsin and Washington Territory. Salt Lake Valley and on Antelope Island; May–July. (750.)

## PRIMULACEÆ.

Primula Parryi, Gray. *Amer. Jour. Sci., n. s.,* 34. 257. Leaves oblanceolate, narrowing to a broad fleshy petiole, and with the rest of the plant somewhat glandular-scabrous, at least upon the margin, which is entire or denticulate with short glandular teeth; leaves of the involucre subulate or linear, unequal, acute, several times shorter than the elongated pedicels; calyx-lobes broad-lanceolate, acute, equaling the tube of the pink corolla; corolla-lobes rounded, obcordately 2-cleft or emarginate.—Leaves ½–1° in length and scape 4–16′ high, with 6–15 flowers upon unequal pedicels ½–3′ long; flowers rose-color, becoming purple in drying. Rocky Mountains of Colorado. Frequent in moist cold localities in the East Humboldt and Clover Mountains, Nevada, and in the Uintas; 8–11,000 feet altitude; July–September. (751.)

Androsace septentrionalis, L. *DC. Prodr.* 8. 52. Annual, acaulescent, somewhat scabrous-pubescent; leaves rosulate, lanceolate or lanceolate-ovate, denticulate, with a broad petiole; scapes numerous, many-flowered; leaflets of the small involucre narrowly lanceolate, acute; calyx-lobes ovate-lanceolate, acuminate, equaling the small white corolla.—Very variable in size; leaves ¼–1½′ long, the 3–20 scapes ½–4′ high, and the 6–20 pedicels nearly as long. From the Saskatchewan to the Rocky Mountains, and north to latitude 68°; Behring Strait; Rocky Mountains of Colorado. East Humboldt and Clover Mountains, Nevada, and frequent in the Wahsatch and Uintas; 6,500–10,000 feet altitude; June–September. (752,) and the more reduced alpine form, (753.)

Androsace occidentalis, Pursh. Smaller than ordinary forms of the last, with fewer scapes and flowers, broader leaves and involucral leaflets, and larger and more foliaceous calyx-lobes. From Illinois to Arkansas and west

to Colorado, New Mexico and Sonora. Jordan Valley, near Salt Lake City, under sage-brush; May. (754.)

Dodecatheon Meadia, L. From Behring Strait and the Arctic Coast southward to the Saskatchewan, and thence to Pennsylvania, North Carolina, Alabama, Western Texas and Colorado, and on the western coast to Southern California. Collected in the Washoe and Havallah ranges, Reese Valley, and East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–10,000 feet altitude; April–September. (755.)

The ordinary dwarf alpine form, 2–8′ high, with 1-few flowers and narrow or oblong-lanceolate leaves, tapering to the petioles. (756.)

Var. frigidum. Exactly like specimens of *D. frigidum*, Ch. & Schl., from Behring Strait; blade of the leaf ovate, narrowing abruptly into the petiole, subrepand; stems 1–2-flowered, 3–5′ high. Similar leaves occur in specimens of undoubted *D. Meadia*, both from California and the Eastern States. No other difference is perceptible. Found in a single locality in the Wahsatch; 9,000 feet altitude. (757.)

Lysimachia ciliata, L. From Mississippi to Colorado and north and eastward to the Saskatchewan, Canada, and New Brunswick; Washington Territory. Wahsatch Mountains and Jordan Valley, Utah; 5–6,000 feet altitude; July. (758.)

Glaux maritima, L. From Cape Cod to Canada and Newfoundland; in salt marshes of Northern Dakota and the Saskatchewan Valley; on the Upper North Platte, (Frémont,) and in Colorado; and on the west coast from the Sacramento River to Sitka. Jordan and Tuilla Valleys, near Salt Lake, Utah; May, June. (759.)

Samolus Valerandi, L., Var. Americanus, Gray. From Florida to Canada and west to the Pacific; reported from Missouri, Arkansas, Indian Territory, Colorado, New Mexico, Sonora, California and Oregon. Only on Antelope Island in Salt Lake; June. (760.)

## LENTIBULACEÆ.

Utricularia vulgaris, L., Var. Americana, Gray. The species occurs from Mississippi to North Carolina, and northward to Newfoundland, Labrador, and Mackenzie River; and has been reported from Arkansas, Nebraska, Colorado, and Oregon. Found in Ruby Lake, Nevada; 6,000 feet altitude; August, in flower. (761.)

Utricularia minor, L. From Rhode Island to Illinois and northward. Flowerless specimens only, probably of this species, were found in Goose Creek Valley, Nevada, and in the Uintas; 5–8,000 feet altitude. (762.)

## OROBANCHACEÆ.

Phelipæa erianthera, Eng. *Proc. Amer. Acad.*, 7. 372. (*Orobanche multiflora*, Nutt.) Glandular-pubescent, simple or branched; flowers in a close spike, purplish, somewhat curved; calyx deeply 5-cleft, bibracteate at base, the segments long and linear; anthers tufted with hairs.—Stems 3–8′ high, stout and fleshy; the calyx-lobes often much elongated, equaling or exceeding the corolla, which also varies in the size and depth of its divisions and in its color. Scarcely differing but in its woolly anthers from *P. Ludoviciana*, with which specimens collected by Dr. Torrey seem to connect both it and *P. comosa*. New Mexico and Chihuahua, and frequent in the valleys and mountains of Nevada and Utah, more usually in subalkaline soils; 4–8,000 feet altitude; June–October. "Too-whoo" of the Pah-Utes, by whom it is eaten. (763.)

Aphyllon uniflorum, T. & G. From Newfoundland and Canada to Florida, Missouri and Texas; California and Washington Territory. Wahsatch Mountains; 7,000 feet altitude; June. (764.)

Aphyllon fasciculatum, T. & G. From Northern Illinois and Lake Michigan to the Saskatchewan; and collected also in Colorado, Sonora, Southern California and Washington Territory. East and West Humboldt Mountains, Nevada, in the Wahsatch, and on Antelope Island; 4,300–7,000 feet altitude; May–July. (765.)

## SCROPHULARIACEÆ.

Verbascum Thapsus, L. Introduced about the Mormon settlements of Utah. (766.)

Antirrhinum Kingii. Annual, 6–18′ high, simple or branched, slender, erect, woolly at base, or puberulent, or nearly glabrous throughout, often with filiform prehensile branchlets; leaves rarely 1′ in length, oblong or usually narrowly lanceolate or linear, attenuated to a short petiole, alternate or the lower ones often opposite, mostly longer than the flowers, but the uppermost becoming very small; pedicels short (1–3″;) calyx-segments unequal, the posterior one oblong, obtuse, nearly equaling the corolla, the rest oblong,

acute, a half shorter; upper lip of the small dull-white corolla 2-lobed, about equaling the palate; capsule globose, 1–2″ in diameter, somewhat oblique, terminated by the short straight and very slender style; seed deeply reticulated.—Flowers 2–3″ long. Approaching nearest to *A. vagans*, Gray, which, however, has the flowers and fruit twice larger, the capsule more oblong and pointed, the persistent style long and deflexed, the petioles considerably shorter and the corolla more saccate. Collected by Stretch in Washoe Valley, and not rare in the dry valleys of Western Nevada from the Washoe to the Shoshone Mountains; also found on Stansbury Island in Salt Lake. PLATE XXI. Fig. 1. A well developed plant; natural size. Fig. 2. Corolla. Fig. 3. Lower lip of corolla, and stamens. Fig. 4. Calyx; all enlarged four diameters. Fig. 5. A portion of the stem of *A. vagans*, Gray; taken from a Californian specimen, (192 Bridges,) and rather more glandular-hairy than the usual form. (767.)

SCROPHULARIA NODOSA, L. From Florida to Canada and throughout the Eastern States; Arkansas, Colorado, and from California to Washington Territory. In the West Humboldt Mountains and Humboldt Pass, Nevada, and in the Wahsatch; 5–6,000 feet altitude; June–October. Like all western specimens, these are somewhat glandular-pubescent throughout and especially in the panicle, the leaves truncate or hastate and very coarsely toothed at base, and the calyx-lobes short and triangular-ovate. (768.)

COLLINSIA PARVIFLORA, Dougl. From Lake Superior to Lake Winnipeg and the Saskatchewan; from Washington Territory to Middle California; Colorado and New Mexico, (Ives.) Frequent throughout Nevada and in the Wahsatch; 4–8,000 feet altitude; May–August. Stems becoming decumbently branched, 3–18′ long. (769.)

PENTSTEMON MENZIESII, Hook. *Gray's Revis. Pentst., Proc. Amer Acad.,* 6. 59. Suffruticose and much branched, glabrous or minutely puberulent; leaves thick, rather small, (1′ or less in length,) elliptical with a narrowed base or obovate-oblong, serrate, dentate; peduncles usually 1-flowered; sepals lanceolate, or from ovate to acuminate-lanceolate; corolla violet or purple, 1′ long, somewhat bilabiate, the throat dilated; anther-cells divergent, more or less adnate above, dehiscent the whole length and becoming expanded, very woolly; sterile filament strongly bearded or nearly naked.—Rocky Mountains of British America, (latitude 51°,) and southward in the

mountains to Oregon and California. Very variable. The typical form, Var. LEWISII, Gray, was collected by Dr. Anderson near Carson City, Nevada.

PENTSTEMON BREVIFLORUS, Benth. *Gray, l. c., p.* 57. Suffruticose, branched, 3–6° high, glabrous; leaves coriaceous, 1–2′ long, linear or oblong-lanceolate with a narrowed base, sharply serrulate; inflorescence panicled, the peduncles several-flowered; sepals ovate, acuminate, glabrous or glandular-hirsute; corolla more or less glandular-bearded externally, yellow with a tinge of purple, deeply bilabiate and ringent, with the lips equaling or longer than the very short tube; anther-cells divergent, adnate above, dehiscent the whole length and becoming expanded, glabrous, as also the sterile filament.—California, and collected by Anderson (136) near Carson City, Nevada.

PENTSTEMON GLABER, Pursh. *Gray, l. c., p.* 59. Very glabrous; leaves usually glaucous, sessile, entire, the cauline lanceolate or ovate-lanceolate; flowers large, in a thyrsoid panicle; sepals broadly ovate, submembranous upon the margin, obtuse or more or less pointed; corolla bright-purple, widely dilated above, the limb shortly 2-lobed, with the lobes rounded and spreading equally; anthers loosely hairy or glabrous, the divaricate cells dehiscent from the base nearly to the summit, but not expanded; sterile filament short-hirsute towards the apex, or glabrous.—From the Upper Missouri to Washington Territory and south to New Mexico. The specimens accord nearly with Var. OCCIDENTALIS, Gray, (*P. speciosus*, Dougl.,) having the anthers and sterile filament glabrous and the leaves often narrow. Stems 6′–2° high, usually several from the same root, stout, with fleshy leaves 2–3′ long and 4–9″ wide; the numerous violet-purple flowers an inch or more in length. Washington Territory, (Douglas,) and Nevada, (Beckwith, Stretch.) Frequent in the valleys and foot-hills from the Trinity to the Havallah Mountains, Nevada; 5–7,000 feet altitude; May–June. (770.)

Var. UTAHENSIS. Stems 3° high, straight and slender; cauline leaves 3–4′ long, oblanceolate, tapering to the clasping base; sepals ovate-acuminate, not at all membranous; anthers and sterile filament hirsute.—Of very distinct habit, and perhaps a good species. Uinta Mountains, (Pack's Cañon,) Utah; 7,000 feet altitude; July. Imperfect specimens in Herb. Gray., collected by Burke in the mountains near Fort Hall, Southern Idaho, appear to be the same, though the flowers are smaller. (771.)

PENTSTEMON CYANANTHUS, Hook. (*P. glaber*, Var. *cyananthus*, Gray; *l. c., p.* 60.) Glabrous; cauline leaves broadly ovate, acuminate; thyrsoid pani-

cle very short; sepals ovate-lanceolate with a long attenuated acumination, scarcely membranous upon the margin; anthers and sterile filament strongly hirsute; otherwise as in *P. glaber*.—Stems slender, 1½–2° high; leaves 2–3′ long by 1–2′ broad, but slightly glaucous; the dense panicle but 3′ in length. The specimens accord with the original description and figure in the Botanical Magazine, and leave no doubt that the species should be maintained. First found in the Rocky Mountains, probably of Wyoming, Wahsatch Mountains, Utah, near Salt Lake City; 5,000 feet altitude; May. (772.)

PENTSTEMON FRÉMONTI, T. & G. *Gray, l. c., p.* 60. Pruinose-puberulent, a span high or more; lower leaves spatulate, the cauline sessile, lanceolate, entire; panicle strict, spikelike, naked, the cymelets approximate, several-flowered, very shortly peduncled; sepals oblong-ovate, acute, membranous upon the margin; corolla 9″ long, narrowly funnel-form, scarcely bilabiate, the lobes rounded, spreading; anthers as in *P. glaber*, sparingly hirsute; sterile filament dilated and bearded at apex.—"Uinta Plains," Utah, (Frémont;) Donner Pass, California, (396 Torrey.)

Var. PARRYI, Gray, Ms. Stems slender, 1–2° high; leaves lanceolate or ovate-lanceolate, 2′ long and 4–9″ wide; the panicle few–many-flowered, more or less interrupted, with the peduncles ½–1′ in length; flowers purple or occasionally nearly white; anthers glabrous except along the dehiscence.—Colorado, (Parry.) Toyabe, Diamond and East Humboldt Mountains, Nevada; 6–7,000 feet altitude; July, August. (773.)

PENTSTEMON CÆRULEUS, Nutt. *Gray, l. c., p.* 61. A span high, glabrous, or the upper stem and leaves usually minutely pubescent, glaucous; leaves thick, entire, sessile, linear-lanceolate; inflorescence thyrsoid, virgate, the peduncles 3–several-flowered, mostly very short; sepals lanceolate, acuminate, the margin usually ciliate, membranous; the corolla 6″ long, somewhat dilated, scarcely bilabiate, with spreading lobes, purple; anthers glabrous, dehiscing to the summit and becoming expanded, often with short-ciliate margins; sterile filament usually dilated and yellow-bearded at the apex.—The single specimen in the collection is 1° in height, wholly glabrous excepting the sterile filament, the larger cauline leaves 2′ long and 3–4″ broad, the lower ones spatulate; the lower cymelets on peduncles 1′ in length. Colorado, Wyoming, and on the Upper Missouri. Diamond Valley, Nevada, in a grassy subalkaline meadow; 6,000 feet altitude; July. (774.)

PENTSTEMON ACUMINATUS, Dougl. *Gray, l. c., p.* 61. Glabrous and

glaucous, 6–18′ high; radical leaves spatulate, the cauline lanceolate, oblong, ovate-lanceolate or subcordate, thick and rigid; thyrse elongated, with numerous flowers; the peduncles mostly very short or none; sepals ovate or lanceolate; corolla 6–10″ long, blue or purple, with the anthers and sterile filament as in the last; capsule very sharply acuminate.—The specimens, collected near Humboldt Lake, Nevada, (May,) are an extreme form; stems stout, 2° high, uppermost leaves broadly cordate and abruptly acuminate, gradually diminishing to the top of the stem, the numerous flowers sessile in their axils; corollas reddish-purple, scarcely 6″ long; sepals lanceolate, acuminate. 390 of Hall & Harbour is an approach to the same form. As recognized, the species is exceedingly variable. From Chihuahua and Western Texas to Colorado; on the Red and Saskatchewan Rivers; Northern Idaho and Washington Territory. (775.)

PENTSTEMON CENTRANTHIFOLIUS, Benth. *Gray, l. c., p.* 63. Glabrous and glaucous; stems 1–3° high, slender; leaves entire and fleshy, the lower cauline petioled and oblanceolate, the upper sessile and clasping, ovate or lanceolate; thyrse elongated, the peduncles 1–3-flowered, shorter than the pedicels; sepals broadly ovate; corolla 1′ long, scarlet or rarely white, tubular and scarcely dilated above, the limb short and equal; anthers dehiscing to the apex and becoming expanded, glabrous; sterile filament glabrous.—Southern California; Arizona, (Palmer.) Provo Cañon, in the Wahsatch; 6,000 feet altitude; July. (776.)

PENTSTEMON CÆSPITOSUS, Nutt. *Gray, l. c., p,* 66. Grayish-puberulent; the branches numerous from the base, short (2–6′) and crowded, decumbent or ascending, leafy to the apex; leaves 3–12′ long, oblanceolate or linear-spatulate, acute and submucronate, entire; peduncles axillary, short, secund, usually with 2 leafy bracts and 1–3 flowers ascending upon short pedicels; sepals linear-lanceolate, somewhat broader and scariously margined at base; corolla 6–9″ long, blueish-purple, tubular, somewhat dilated above and biplicate, the limb shortly bilabiate with nearly equal lobes; anthers glabrous, the cells becoming expanded; sterile filament bearded.—Colorado and Wyoming Territories. Barren hills of Bear River Valley, near Evanston, Utah; 6,000 feet altitude; July. With the short leaves and nearly sessile solitary flowers of Nuttall's original specimens. (777.)

PENTSTEMON CRISTATUS, Nutt. *Gray, l. c., p.* 67. Viscid-pubescent; lower leaves oblanceolate, petioled, upper ones oblong-lanceolate, sessile,

clasping, entire or denticulate; panicle strict, with short appressed 3–4-flowered peduncles; sepals linear-lanceolate, attenuate, very hirsute; corolla 1′ long, violet, broadly funnel-form above the calyx, somewhat bilabiate, the lower lip and sterile filament strongly bearded with long hairs; anthers glabrous, expanding.—In a single locality on a limestone ridge near Roberts Creek Station, Nevada; the specimens 1° high, with rather leafy close conspicuously bracted panicles. Western Nebraska and on the Upper Missouri from Southern Dakota to the Rocky Mountains. (778.)

PENTSTEMON PALMERI, Gray. *Proc. Amer. Acad.*, 8. 291. Stout, 2–5° high, glabrous, glaucous, the panicles glandular-puberulent; leaves broadly ovate- or oblong-lanceolate, sharply and unequally sinuate-dentate, the lowermost spatulate and petioled, the upper amplexicaul; panicle naked, elongated, racemose, the rather short peduncles 2–4-flowered, with small bracts and slender pedicels; sepals ovate, mostly acute; corolla 1½′ in length, pale purple or rose-color, broadly dilated-campanulate above the calyx, with an open throat and somewhat expanded limb, the lower lip bearded; anthers glabrous, expanding; sterile filament exserted, curved above and very hirsute with yellow hairs.—A well-marked and exceedingly handsome species, near *P. Cobæa;* cauline leaves 3–5′ long and 2′ wide. Arizona. Foot-hills of the Trinity, West and East Humboldt Mountains, Nevada; 5–6,000 feet altitude; June, July. Also from Southern Utah, (Palmer.) (779.)

PENTSTEMON HUMILIS, Nutt. (?) *Gray, l. c., p.* 69. Minutely puberulent or somewhat glabrous, 3–10′ high; lower leaves ovate-spatulate or oblanceolate, petioled, the upper oblong or linear-lanceolate, sessile and clasping, all acute or acuminate and entire; peduncles rather short, appressed, 2–5-flowered; sepals ovate-lanceolate with usually a slender herbaceous recurved acumination, and with the pedicels viscid-pubescent; corolla 4–8″ long, deep-blue, dilating upwards, somewhat bilabiate, the throat open and without folds; anthers glabrous, expanding; sterile filament yellow-bearded. —The specimens differ from those collected in Colorado in being more puberulent and with the deep-purple corolla (4–7″ long) rather less dilated, the lower lip frequently somewhat bearded. East Humboldt Mountains, Nevada; 8,000 feet altitude; July. (780.)

Var. (?) Stem very slender, 4–8′ high; lower leaves ovate, abruptly contracted into the petiole, the upper oblong, 4–8″ long and 3″ wide, clasping, all entire and abruptly acute, or obtuse and mucronate; flowers light

blue, 4–5″ long, the lower lip bearded, tube more dilated and the limb more spreading than the last.—This may be a reduced alpine entire-leaved form of *P. pruinosus*, Dougl., and was also collected by Lyall. In the Wahsatch Mountains; 9–10,000 feet altitude; July, August. (781.)

PENTSTEMON GLAUCUS, Grah. *Gray, l. c., p.* 70. Glabrous, excepting the viscid-pubescent inflorescence, ½–1½° high; leaves somewhat glaucous, denticulate or entire, the lower ovate or lanceolate, petioled, the upper oblong-lanceolate, dilated at base and clasping; thyrse subcompact, or more usually interrupted, with 2–4 pairs of cymelets which are more or less peduncled; sepals ovate-lanceolate; corolla 1′ in length, violet or lilac-color, abruptly and widely dilated above the base, the throat open and without folds, the lower lip slightly longer and sparingly villous with long hairs; anthers glabrous and expanding; sterile filament yellow-bearded. Var. STENOSEPALUS, Gray. The sepals lanceolate, with a long and slender acumination.—The specimens are exactly those of the Colorado collections, but taller (1–2°) and with a more loose and interrupted inflorescence. The flower was most usually of a dull lurid purple-color, rarely light-blue. In the Wahsatch and Uinta Mountains; 9–10,000 feet altitude; July, August. (782.)

PENTSTEMON CONFERTUS, Dougl. *Gray, l. c., p.* 72. Glabrous, upright; lower leaves oblong-lanceolate, petioled, the upper sessile and lanceolate or somewhat ovate, all entire; flowers in an interrupted spike, densely clustered, the upper cymes nearly sessile, often reflexed; sepals with a broad scarious margin, lanceolate or ovate, acute or usually acuminate, often erose-dentate or laciniate; corolla 5–6′ long, sulphur-yellow, narrow, somewhat bilabiate, with the palate sparingly hairy; anthers glabrous, expanding; sterile filament bearded. Var. CÆRULEO-PURPUREUS, Gray. Stems 6′–2° high, with the corolla deep bluish-purple.—From the Saskatchewan to Washington Territory and Northern California, and in the Rocky Mountains of Colorado. Wahsatch Mountains, Utah; 6,000 feet altitude; June, July. (783.)

An alpine form of the same variety, 6′ high, with the corolla but 3–4″ long and less dilated, sometimes reddish-purple, the sepals short and erose-dentate, was found in the West Humboldt and Clover Mountains, Nevada; 9,000 feet altitude; August, September. (784.)

PENTSTEMON DEUSTUS, Dougl. *Gray, l. c., p.* 73. Glabrous; stems numerous, branching from a woody base; leaves often laciniately or pectinately serrate, the cauline oblong or lanceolate; panicle strict, densely many-flowered,

the cymes pedunculated; sepals lanceolate, acuminate; corolla yellowish, $\frac{1}{2}'$ long, scarcely bilabiate and but little dilated; anthers glabrous, expanding; sterile filament glabrous.—The numerous specimens of the collection differ in some respects from the above description, having the panicles for the most part elongated and not crowded, the upright peduncles rarely equaling the flowers, the leaves denticulate or entire, and the sterile filament frequently bearded with yellow hairs. Stems 4–15′ high, ascending; leaves $\frac{1}{2}$–$1\frac{1}{2}'$ in length, 2–4″ wide, sometimes very obtuse and erosely dentate; flowers usually secund, dull brownish-yellow or slightly rose-colored. Idaho and Washington Territory. Foot-hills of the Trinity and Pah-Ute ranges and in the East and West Humboldt Mountains, Nevada; 5–7,000 feet altitude; June–August. (785.)

PENTSTEMON GRACILENTUS, Gray; *l. c., p.* 75. Stem slender, ascending, about 1° high, glabrous; leaves entire, the lower 2′ long, lanceolate, attenuate into slender (1′) petioles, the upper linear with a narrowed base, and the floral ones linear-setaceous; peduncles few, slender, 3–5-flowered; the sepals and pedicels equal, glandular-puberulent; the blue corolla $\frac{1}{2}'$ long, slightly dilated above; anthers glabrous, the cells confluent at the apex and dehiscent downward to the middle, minutely denticulate upon the margins; the sterile filament filiform and bearded.—Northern California and near Carson City, Nevada, (111 Anderson.)

PENTSTEMON HETEROPHYLLUS, Lindl. *Gray, l. c., p.* 75. Glabrous or pruinose-puberulent, scarcely glaucous; leaves entire, the cauline linear-lanceolate or narrowly linear, attenuate at base; raceme virgate, the slender peduncles 1- or rarely 2-flowered; sepals broad, abruptly acuminate; corolla reddish-purple, 1′ long, dilated-funnelform above, slightly bilabiate; anther-cells confluent at the apex, dehiscent to the middle, and saccate at base, hirsutely ciliate upon the margins.—Stems 1–$2\frac{1}{2}$° high, slender, often diffusely branched; leaves 2–4′ long, 1–5″ wide. The present specimens are all glaucous, with unusually small sepals, scarcely a line in length and mostly obtuse. California, throughout its whole length. Wahsatch Mountains, (Provo Cañon;) 6,000 feet altitude; July. (786.)

Var. LATIFOLIUS. Shrubby at base; leaves ovate, oblong or lanceolate, 9″–$2\frac{1}{2}'$ long by $\frac{1}{4}$–1′ wide; sepals ovate with a long reflexed acumination. Wahsatch Mountains; 5–8,000 feet altitude; July, August. (787.)

PENTSTEMON KINGII. Pruinose- or glandular-pubescent, at least below;

stems numerous from a shrubby base, ascending, 4–8′ high; leaves oblanceolate, mostly acute, entire, sessile with a narrowed base, the lowermost somewhat spatulate and short-petioled, 1–2′ long by 2–4″ wide; the secund racemes short and rather leafy at base, with 1–4-flowered peduncles; sepals ovate or oblong-lanceolate, more or less acuminate, sometimes slightly scarious and erose upon the margin; corolla 8″ in length, purple, dilated upward, somewhat bilabiate; anther with confluent lobes, dehiscent to the middle, glabrous but hirsute-ciliate upon the margins; sterile filament flattened toward the apex, glabrous.—From the West Humboldt Mountains to Monitor Valley, Nevada, and in the Wahsatch and Uintas; 6–7,000 feet altitude; June, July. (788.)

Mimulus Lewisii, Pursh. *DC. Prodr.* 10. 370. Puberulent and somewhat viscid-pubescent, erect; leaves amplexicaul, oblong or rarely ovate, acute, subdentate or denticulate, 5–7-nerved; peduncles longer than the leaves; teeth of the dilated tubular calyx short, acuminate; corolla large, 1–1¾′ in length, deep rose-color, the throat spotted with yellow, lobes not reflexed; anthers included, glabrous.—Stems 1–3° high, with leaves 2–3′ long; musky; growing on the banks of mountain streams. Distinct from *M. cardinalis*, which is a Californian species, villous, with ovate erose-dentate leaves, reflexed corolla-limb and subexserted villous anthers. The latter probably occurs in the Sierras of Western Nevada, but 28 Anderson from near Carson City has glabrous anthers and is a doubtful specimen. Rocky Mountains of British America (latitude 56°) and Southern Montana; Wind River Mountains, Wyoming; Cascade Mountains, Oregon. East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 7–8,000 feet altitude; July, August. (789.)

Mimulus luteus, L. *DC. Prodr.* 10. 370. Glabrous or viscid-puberulent; stem ascending or erect; leaves mostly erose-dentate, orbicular, ovate, or somewhat oblong, the lower long-petioled and often sublyrate, the upper sessile or cordate-amplexicaul, about 7-nerved, shorter than the peduncles; calyx ovate, becoming inflated, with ovate teeth, the upper one largest; tube of the dilated yellow corolla twice longer than the calyx, the lower lip bearded.—Very variable; stem 3′–4° high, somewhat stoloniferous at base; corolla 6–18″ in length. On the western coast from Unalaska to California; Utah and Colorado. Frequent on the banks of mountain streams through Nevada and Utah; 5–6,000 feet altitude; May–July. (790.)

Var. Flowers small, 3–6″ in length; stems 2–10′ high; mostly depauperate specimens.—It is difficult to draw a line of distinction between *M. luteus* and *M. glabratus*, and so far as North American specimens, at least, are concerned, there can be but one species. Even the same plant may show reduced flowers at the base and large well-developed corollas above. *M. propinquus*, Lindl., is probably the same. *M. Jamesii* is more distinct in its habit and will doubtless be retained, though at one time referred to *M. glabratus*. Havallah, West Humboldt and Diamond Mountains, Nevada; 5,500 6,000 feet altitude; June–September. (791.)

Var. ALPINUS, Gray. Stems 3′ high from a decumbent or creeping base, 1–3-flowered; leaves mostly sessile, somewhat entire.—Collected by Parry in Colorado, and by Lyall on the Northern Boundary. East Humboldt Mountains Nevada; 9,000 feet altitude; August. (792.)

MIMULUS PRIMULOIDES, Benth. *DC. Prodr.* 10. 372. Glabrous or sparingly pilose, stoloniferous; stem 2–4′ high, somewhat winged; leaves sessile, ½–1′ long, obovate or orbicular, entire or denticulate, 3–5-nerved; peduncles few, (1–2,) elongated, 1–2′ in length; calyx tubular, 3–4″ long, but slightly dilated in fruit, the teeth short and equal; corolla yellow, ½′ in length.—A pretty subalpine species. Cascade and Blue Mountains of Washington and Oregon Territories; California. East Humboldt Mountains, Nevada; 8,000 feet altitude; August. Collected also by Anderson near Carson City. (793.)

MIMULUS FLORIBUNDUS, Dougl. *DC. Prodr.* 10. 372. Viscidly pilose; stems slender, 2–18′ long, diffusely branching at the base, ascending; leaves petioled, 3–18″ in length, ovate, dentate or denticulate, the lower subcordate, somewhat pinnately 5–7-nerved; peduncles axillary to nearly every leaf, solitary, slender, mostly exceeding the leaves; calyx ovate, 5-angled, with short subequal teeth, becoming much dilated; corolla yellow, 3–4″ long, twice longer than the calyx.—Washington Territory to California. Truckee Valley and East Humboldt Mountains, Nevada, and in the Wahsatch; 4,500–6,000 feet altitude; July–September. (794.)

MIMULUS MOSCHATUS, Dougl. *DC. Prodr.* 10. 372. Stem viscidly woolly, branching from the base, prostrate or suberect; leaves on short petioles, ovate, acute, dentate, pinnately nerved, viscidly pilose; peduncles usually a little shorter than the leaves, solitary; calyx tubular, becoming ovate, the teeth lanceolate, acuminate, somewhat unequal; corolla-limb yel-

low, subequally 5-lobed, the lower lobe pubescent, the tube about half longer than the calyx.—Growing in the mud, and stems often rooting, 3–12′ long; leaves ½–1½′ and corolla 6–9″ long; diffusing a strong musky odor. Washington Territory to Northern California. East Humboldt Mountains, Nevada, and in the Wahsatch; 7–8,500 feet altitude; June–August. (795.)

MIMULUS PILOSUS. (*Herpestis*, Benth. *DC. Prodr.* 10. 394.) Annual, erect, 2–10′ high, branched from base, viscid and very softly pilose; leaves 1–2′ long, sessile, oblong or lanceolate, acutish, mostly entire; peduncles a little exceeding the calyx but becoming elongated, shorter than the leaves; corolla yellow, 3″ long, scarcely exceeding the calyx, broadly tubular, slightly dilated above, the upper lip more or less 2-lobed, the lower with two purple spots at base; capsule 2½″ long, ovate-oblong, acute, subsulcate above, the valves usually entire.—Calyx unequally 5-toothed, angular, enlarging somewhat in fruit. The apparent continuation of the sinuses in a membranous line to the base may probably account for the reference of this plant to *Herpestis*, where it has formed the section *Mimuloides*. The divaricate anther-cells are oblong, instead of linear as described, and the dilated apex of the style is suborbicular and apparently entire. Northern California. Collected in Truckee River bottom; July. (796.)

MIMULUS RUBELLUS, Gray. *Mex. Bound. Rep.*, *p.* 116. Annual, dwarf, (½–3′ high,) glabrous or viscid-puberulent; stem erect, simple or much branched; leaves 2–6″ long, obovate or spatulate, narrowly oblong or lanceolate or linear, 3–5-nerved, mostly entire, sessile and narrowed at base or the lower shortly petioled, about equaling the peduncles; calyx oblong, 1–2″ in length, becoming somewhat dilated, the mouth squarely truncate with short equal teeth; corolla yellow, red, or purple, small and scarcely exserted, or 2–3 times longer than the calyx and the limb dilated.—A quite variable species, including *M. montioides*, Gray. The extremes of form are connected by intermediate grades; as in *M. glutinosus* and *Eunanus Frémonti*, the corolla may be either red or yellow, and even in the yellow-flowered variety the calyx and often the whole plant is more or less purplish. New Mexico and Colorado; in the Sierras of California; and collected also by Lyall on the Northern Cascade Mountains. Washoe, East Humboldt and Clover Mountains, Nevada, Wahsatch Mountains and Antelope Island, Utah; 5–10,000 feet altitude; April–September. (797.)

Var. LATIFLORA. The form with larger corolla, 5–6″ in length, the limb dilated and throat conspicuously dotted with purple.—A pretty dwarf flower of earliest spring, forming bright patches of color among the sage-brush in the lower valleys, the delicate inch-long stem seeming scarce able to sustain the absurdly disproportionate flowers that terminate it. Carson Valley, Nevada; April. (798.)

EUNANUS[1] FREMONTI, DC. *Prodr.* 10. 374. Viscidly pubescent or villous; stems 1–10′ high, simple or branching from the base; leaves 6–18″ long, obovate, oblong or lanceolate, attenuate to the base, entire or obscurely denticulate, rather acute; peduncles 1–4″ long, shorter than the leaves; calyx 3–4″ long, oblong, membranous, becoming much inflated, the teeth triangular-ovate, acute, subequal or the upper a little longer than the lower; corolla ½–1′ long, yellow or deep purple, with subequal retuse lobes, the throat usually bearded; style funnelform at top; ovary oblong-linear, membranous, a little exceeding the calyx.—Varying greatly in size; early specimens have a single flower, the length of which often exceeds that of the stem, while later in the season they become 6′ or more in height, more or less branched and with numerous flowers. Throughout California. Frequent on the foot-hills of the Washoe, Trinity, Pah-Ute and Toyabe Mountains, Nevada; 5–6,000 feet altitude; April–July. (799.)

EUNANUS BIGELOVII, Gray. *Pac. R. R. Surv.* 4. 121. More or less viscid-pubescent, 1–6′ high; cauline leaves oblong-lanceolate or broadly ovate, sessile, numerous and embracing the nearly sessile flowers; calyx 4–5″ long, subcampanulate, strongly plicate-angled, mouth scarcely oblique, teeth unequal, triangular-subulate, pungent, rather more than half the length of the tube; corolla-tube twice longer than the calyx, limb broadly spreading, lobes of equal length; stigma entire.—Southern California and Western Arizona, (Ives.) Found near Virginia City by Bloomer, and by Dr. Torrey (372) at Steamboat Springs in Washoe Valley, Nevada. Judging from the description *E. Tolmiei* may be the same. *E. Coulteri* has narrow radical leaves and, as well as *E. Douglasii*, an elongated narrow-throated herbaceous calyx and

[1] EUNANUS, A. DC. Calyx tubular, 5-angled, 5-toothed. Corolla-tube long-funnelform; limb subequally 5-cleft or bilabiate, the upper lip large, erect, deeply bifid, the lower nearly equal or shorter; throat naked. Stamens 4, fertile; anther-cells distinct. Style dilated and petaloid at apex, varying in form. Capsule oblong, dehiscing loculicidally, the valves entire, bearing attached to the middle the septum with the separated placentæ. Seeds small, ovoid-compressed.—Dwarf annual herbs, with opposite leaves and axillary solitary flowers, the corolla disproportionately large and the anthers often cruciately approximate in pairs.

elongated corolla-tube, and the latter species also a peculiar almost woody gibbous-based oval capsule.

Gratiola Virginiana, L. From the Gulf of Mexico to Canada, the Red River of the North and Oregon. Truckee Valley, Nevada, (W. W. Bailey ;) July. (800.)

Limosella aquatica, L. Leaves long-petioled, oblong or linear-spatulate.—The petioles in some of the present specimens are unusually elongated, (2–7′,) the floating limb being 4–8″ long and 2–3″ in width, and the submerged peduncles 2–4″ in length; in other specimens, not submerged, the entire leaf is but an inch in length with a much narrower blade; capsules oblong, somewhat acute. York Factory on Hudson's Bay; Rocky Mountains, Colorado. Goose Creek Valley, Nevada, and in the valleys of the Wahsatch and Uintas; 6,000 feet altitude; July–September. (801.)

Synthyris pinnatifida. Somewhat villous; stem 3–8′ high, usually exceeding the leaves; radical leaves long-petioled, pinnately-divided, broadly ovate in outline, the lower of the 3–4 pairs of lobes nearly distinct, the upper confluent, all laciniately pinnatifid and the segments laciniately toothed; cauline leaves bracteate to the pedicels, small, mostly ovate, toothed, or the uppermost oblong and entire; raceme 1–2′ long, densely flowered above; calyx-lobes oblong, mostly obtuse; corolla nearly twice longer than the calyx, incurved, the lower lip deeply 3-lobed, the upper entire.—Found only in fruit, with the remains of flowers, which are apparently white. Wahsatch Mountains, on a rocky ridge at the head of American Fork Cañon; 9,000 feet altitude; August. Plate XXII. Fig. 1. A plant; natural size Fig. 2. Flowers; enlarged four diameters. (802.)

Veronica Anagallis, L. Northern States, and throughout Canada to the Rocky Mountains, Washington Territory and Sitka; Nebraska; New Mexico. In Thousand Spring Valley, Nevada, and in the Jordan and Weber Valleys, Utah; 4,500–6,000 feet altitude; May–September. (803.)

Veronica Americana, Schwein. Northern States; Canada and to the Saskatchewan; Colorado, California, and Alaska. Rather frequent in Nevada and Utah, from the West Humboldt Mountains to the Uintas; 5–8,000 feet altitude; May–October. Much more common than the last, but sometimes growing with it; flowers deeper blue. (804.)

Veronica alpina, L. In the White Mountains; Labrador and Greenland; Unalaska, Sitka, and in the mountains southward to Washington

Territory, and in the Rocky Mountains of Colorado. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 8–9,000 feet altitude; July–September. (805.)

Veronica serpyllifolia, L. "From Unalaska southward throughout the continent;" reported, west of the Mississippi, from Colorado and Idaho. In the Wahsatch and Uintas; 8–9,000 feet altitude; July, August. Subalpine and rare. (806.)

Veronica peregrina, L. From Canada to the Great Slave Lake, the Upper Missouri, and Northern California, and southward throughout the continent. Rather frequent through Nevada and Utah; 4,500–6,500 feet altitude; May–September. (807.)

Castilleia linariæfolia, Benth. *DC. Prodr.* 10. 232. *Gray's Rev. Castil., Amer. Jour. Sci., n. s.,* 34. 335. Glabrous or loosely woolly-pubescent above; leaves long and usually linear, entire or often 3-cleft or 3-parted, narrowed at base, the floral ones scarlet-colored and acute; spike interrupted; calyx incurved, deeply cleft anteriorly, subulately 4-toothed at the apex; galea of the corolla elongated and usually much exserted, the lobes of the lower lip linear-subulate.—Stems 1½–2° high, (4–6°, *Thurber,*) from a woody base, simple or branched, somewhat glaucous, shining, rarely pubescent throughout; leaves 1–3′ long, occasionally 3–4″ broad, 1-nerved or more or less 3-nerved at base; flowers sessile or upon short peduncles, the calyx ½–1′ long, usually exceeding the bracts, colored; corolla 1–2′ long, nearly glabrous, bright scarlet, the yellow galea usually 1′ or more in length or sometimes scarcely exsert. A showy and well-marked species, growing on dry rocky mountain sides. Sonora, Arizona, New Mexico, and Colorado. Washoe, East and West Humboldt and Toyabe Mountains, Nevada, and in the Wahsatch; 6–8,000 feet altitude; June–September. (808.)

Castilleia affinis, H. & A. *Gray, l. c.,* 336. Root annual or biennial; hirsutely pubescent or sometimes nearly glabrous; leaves linear or lanceolate-attenuate, the floral ones rarely 3-cleft; flowers more or less pedicelled; calyx cleft to the middle, both above and below, the segments narrow, usually 2-cleft or emarginate; galea elongated, falcate, the lip very short.—California; Arizona, (Ives.) Var. minor, Gray. The floral leaves colored only at the tips; calyx green and herbaceous; galea of the pale corolla but 3–4″ long and little exceeding the calyx.—Northern Mexico and New Mexico. The numerous specimens of the collection show a slender

leafy stem, 1½–2° high, simple or branched; leaves varying from linear to oblong-lanceolate, 2–8″ in width and 1½–4′ long, with a long attenuate acumination, strongly 3-nerved, the floral ones more or less dilated at base and exceeding the flowers, which are either axillary along nearly the whole length of the stem or clustered at the summit, where alone the tips of the bracts are conspicuously colored. Only on stream-banks; Truckee and Ruby Vallies and in the East Humboldt Mountains, Nevada; 4–6,500 feet altitude; July–September. (809.)

CASTILLEIA PARVIFLORA, Bong. *Gray*, *l. c.*, 336. Perennial; pilose-pubescent or hirsute nearly throughout, scarcely hispid; leaves for the most part 3-cleft or laciniately pinnate, the floral ones more or less dilated and nearly always colored; calyx deeply cleft both above and below, the segments either emarginately 2-lobed or deeply bifid with the lobes oblong or linear; lip of the corolla very short.—The most common and a rather variable species; stems 3–20′ high, usually numerous, simple or branched; the lower leaves usually, and sometimes nearly all, entire and linear; spike usually short and dense, sometimes elongated; the color of the floral leaves varies from deep-red to flesh-color and yellow, rarely green; the galea often scarcely exceeds the calyx, or may be exserted 5–6″. From Washington Territory to Colorado, Arizona, (Ives,) and Southern California. Very frequent on mountain slopes, from the Washoe Mountains to the Wahsatch; 5–10,000 feet altitude; April–August. (810.)

CASTILLEIA PALLIDA, Kth. Vermont and New Hampshire, and throughout British America from Labrador to the Great Bear Lake, and Behring Strait; southward in the mountains to California, Northern Arizona, and Colorado. Found from the Truckee to the East Humboldt Mountains, Nevada, and in the Uintas and Wahsatch; 6–10,000 feet altitude; June–September. The floral leaves in the specimens are mostly entire, broadly oval and often rounded at the apex, not unfrequently concealing the flowers; the galea varies much in length, scarcely exserted from the calyx or 4–6″ long; bracts usually dull-scarlet rather than ochroleucous, which color was met with only in Utah. It would not appear from these specimens that any constant length of galea gives ground for a variety *miniata*. (811.)

Var. With the floral leaves narrower and lobed, the lower leaves linear or lanceolate; color ochroleucous or shades of red. Truckee Valley,

East Humboldt and Clover Mountains, Nevada; 5 9,000 feet altitude; July September. (812.)

CASTILLEIA FLAVA. Perennial; stems numerous, 10–15′ high, villous-pubescent at base, canescently puberulent above, simple or branched; leaves with a short woolly pubescence, linear, entire, or the uppermost with a few linear lobes, the floral ones somewhat dilated and colored, (yellow,) deeply 3-cleft, the lanceolate lobes equaling the calyx; spikes dense, elongated, 3–6′ long; calyx 2-cleft, the anterior fissure reaching to below the middle, twice deeper than the posterior one, the lobes 2-toothed; the yellowish-green galea 4″ long, exserted its whole length, the lip very short.—Approaching *C. purpurea* and *integra.* Bear River Valley, near the Uintas; 7,000 feet altitude; July. (813.)

ORTHOCARPUS[1] HISPIDUS, Benth. *DC. Prodr.* 10. 535. Pilose-pubescent; stems 4–12′ high, strict, rather slender, simple or branched; leaves linear to ovate-lanceolate and few-lobed, or linear and entire; spike dense, interrupted below; bracts dilated, about equaling the flowers, coarsely and acutely 5-lobed; calyx 3–4″ long, the lanceolate teeth shorter than the tube; corolla 5–9″ long, yellow, puberulent or glabrous, the galea subulate, very acute, straight, exceeding the somewhat saccate lip; teeth very short; capsule 3″ long, ovate.—Collected on the Columbia River by Douglas and Lyall, in the Klamath Valley by Cronkhite, and near Carson City, Nevada, by Dr. Anderson.

ORTHOCARPUS TOLMIEI, H. & A. *DC. Prodr.* 10. 536. Erect, puberulent, 4–18′ high, the branches virgate, spreading; leaves linear or linear-lanceolate, 1–2′ long, entire or rarely incised, the bracts divaricately 3-cleft, the lobes acuminate; spikes short, (1–2′,) rather dense; calyx 2–3″ long, the tube twice exceeding the ovate-lanceolate teeth; corolla 4–6″ long, bright yellow, glabrous, the galea uncinate, little exceeding the narrowly saccate 3-plicate lip, slightly hairy on the margins, the teeth very short; capsule oblong, 2″ long, retuse, compressed; seeds 4–6, oblong, 1″ long,

[1] ORTHOCARPUS, NUTT. Calyx tubular-campanulate, membranous at base, usually subequally 4-cleft or 4-toothed. Corolla-tube slender; galea erect, entire, channeled, the margin inflexed; lower lip shorter, 3-plicate or 3-saccate, subentire at the apex or with three erect teeth. Stamens with one anther-cell fixed by the middle, the other pendulous, smaller, or wanting. Capsule loculicidal. Seeds usually numerous and small, with a loose reticulated or pitted testa, the radicle usually pointing toward the hilum.—Annual herbs, (perennial in *O. pallescens*,) with alternate leaves mostly incised toward the apex, the flowers sessile or short-pediceled in rather close terminal leafy spikes, the bracts mostly 5–7-lobed. From the Rocky Mountains westward to the Pacific. BENTH., *in DC. Prodr.*

ascending, longitudinally striate, and narrowly margined on the ventral side.—Collected only by Tolmie in Southern Idaho, but not rare in the Wahsatch Mountains, Utah; 6–9,000 feet altitude; June–August. The radicle is described by Bentham in his generic character as inferior; in this species as in the following it is, at least sometimes, superior. (814.)

ORTHOCARPUS LUTEUS, Nutt. *DC. Prodr.* 10. 536. Somewhat resembling the last, but hispid, with the branches erect and strict; spikes elongated and rather dense; bracts oblong or ovate, entire or 3-lobed or very rarely 5-lobed, the segments acute or obtusish; calyx 3–4″ long, the lanceolate or ovate acute teeth a little shorter than the tube; corolla pubescent and the margins of the galea more hairy, little exceeding the bracts; capsule 3″ long, oblong, obtuse, many-seeded; seeds small.—Ovary about 36-ovuled, the ovules more or less pendulous, and orthotropous, campylotropous-reniform or anatropous even in the same ovary. From the Saskatchewan and Red River of the North to Washington Territory and southward in the Rocky Mountains to New Mexico. Washoe and Ruby Valleys, Nevada; 4,500–6,000 feet altitude; July–September. (815.)

ORTHOCARPUS PILOSUS. Perennial (?), pilose-pubescent; stems rather stout, ascending, branched, 10′ high; leaves 2–3′ long, lanceolate, 3-nerved, divaricately few-lobed, the middle lobe broad, dilated and rounded at the apex; calyx cleft nearly to the base anteriorly, 4-lobed to the middle, nearly equaling the (9″ long) puberulent yellowish corolla; lip 3-plicate, moderately dilated, the narrow oblong teeth nearly half shorter than the straight acute galea; capsule 4″ long, oblong, acute; seeds small, pitted.—Collected only by Stretch in Washoe Valley, Nevada; a single specimen in Herb. Torrey.

CORDYLANTHUS[1] CAPITATUS, Nutt. *DC. Prodr.* 10. 597. *Gray, l. c.*, 382. Erect, 1–2° high, branched, pilose-pubescent; leaves pinnatifid, 3-cleft or mostly entire, floral ones 3-cleft or subpinnatifid; flowers capitate

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[1] CORDYLANTHUS, NUTT. Calyx 1–2-leaved, spathe-like, the leaves nerved, entire, or the upper one emarginate or rarely 2-cleft. Corolla tubular, slightly dilated upward; lips short, rarely unequal in length, the lower broad and with three very obtuse and short crenations. Stamens (4 or sometimes 2) as in *Orthocarpus*. Anther-cells either pilose-ciliate or with the base and apex minutely bearded. Style usually with an uncinately inflexed apex, thickened beneath the entire terminal stigma. Ovules several, ascending, almost orthotropous with a minute beak that becomes reflexed, or campylotropus-reniform. Capsule compressed, loculicidal. Seeds few or rather numerous, the nucleus small in comparison with the testa, narrow, nearly straight, apiculate; radicle superior.—Annual branching herbs with narrow leaves, the yellow or dull-purple flowers capitate, spicate or in panicles at the extremities of the branches. GRAY, *Proc. Amer. Acad.* 7. 381.

sessile, with usually a single linear obtuse bract; calyx 2-leaved, the lower leaf exterior in æstivation, 3–5-nerved, the upper 2-nerved and 2-toothed at the apex, corolla 6–8″ long, purplish; stamens 2, the filaments flattened and nearly glabrous and the anthers 1-celled; capsule oblong, 8-seeded.—According precisely with the fragment of Nuttall's own (Californian ?) specimen in Herb. Gray., in which also the anther is 1-celled, instead of 2-celled as described; the lower sepal is 3-nerved at base, 5-nerved toward the apex. Foot-hills of the Clover Mountains, Nevada; 6,500 feet altitude; September. (816.)

Cordylanthus ramosus, Nutt. *DC. Prodr.* 10. 597. Erect, 6–10′ high, branched, canescent with a minute scabrous pubescence; leaves pinnately 3–5-parted with filiform segments, the floral ones with 5–7 equal filiform lobes scarcely dilated at the apex; flowers capitate; bracts entire or 2–3-lobed; calyx-leaves but little shorter than the yellow (6–8″ long) corolla, ovate or oblong, obtuse, 5–6-nerved, the upper one emarginate; stamens 4, filaments more or less villous, the anthers 2-celled; capsule 4–5″ long, linear-oblong, 20-seeded.—Very near *C. filifolius*, but probably distinct. The apparently filiform segments of the leaves are in reality narrowly linear with closely revolute margins. Monitor and Ruby Valleys and East Humboldt Mountains, Nevada, and in the Wahsatch; 6–9,000 feet altitude; July, August. (817.)

Cordylanthus tenuis, Gray; *l. c.*, 383. Loosely panicled, 2° high, very minutely puberulent, almost glabrous; branchlets filiform, leaves narrowly linear or filiform, entire, the floral ones with a callous apex, rarely bidenticulate or emarginate; flowers becoming scattered; calyx-leaves oblong-lanceolate, 5–6-nerved, the upper one entire or emarginate; corolla 6–8″ long, purplish and yellowish; stamens 4, with more or less villous filaments and 2-celled anthers; seeds semi-ovate, with recurved beak, smooth.—In the California Sierras, and near Lake Tahoe, Nevada, (Anderson.)

Cordylanthus laxiflorus, Gray. *Bot. Mex. Bound.* 120. *Rev. Cord.*, *l. c.*, 383. 1–2° high, paniculately branched, very hirsute, subglandular; leaves all linear, short, entire or rarely trifid; flowers solitary or approximate upon the short leafy branches, with a single bract; sepals 6-nerved, the upper one bidentate; corolla yellow, rather deeply bilabiate, the lower lip a half shorter than the galea; stamens 4, the lower anther-cell either

abortive or on the shorter stamens wholly wanting; filaments slightly villous.—Sonora, (Thurber;) near Great Salt Lake, (Frémont.)

Cordylanthus canescens, Gray; *l. c.*, 383. Hoary with a short soft pubescence; stem erect, 1° high; leaves lanceolate-linear, acute, suberect, entire; flowers purplish, few, in a simple spike or head, each sessile in the axil of a clasping lanceolate bract; bractlets none; the single calyx-leaf opposite to the bract, 2-toothed; filaments glabrous, and the anther-cells hairy only at base.—Near Carson City, (Anderson,) and Lake Washoe, (Torrey.)

Cordylanthus Kingii. Erect, branched, pubescent with glandular hairs; leaves 3-cleft, segments linear; flowers in a loose simple spike, solitary and sessile in the axils of clasping bracts, which are 3–5-cleft and equaling the flower; bractlets none; calyx-leaves single and opposite to the bract, 2–3-toothed at the apex; stamens 4, with hairy filaments and 2-celled anthers, which are bearded at the base and apex.—Flowers few, (4–6,) pubescent with reflexed hairs, rather large, (10″ long,) purple. Rare; found only on a limestone ridge near Roberts Station in Monitor Valley, Nevada; 6,000 feet altitude; July. Plate XXII. Fig. 3. A plant; natural size. Fig. 4. Bract and calyx-leaf; natural size. Fig. 5. Corolla, laid open. Fig. 6. Ovary and style; enlarged two diameters. (818.)

Pedicularis Grœnlandica, Retz. *DC. Prodr.* 10. 566. Erect, 1–2° high, glabrous; stem simple, leafy; leaves pinnately parted, the segments lanceolate-linear, serrate; spikes elongated, 3–8′ long, many-flowered; calyx (2–3″) tubular, 5-toothed, the upper tooth smallest and the lateral ones with very shallow sinuses; galea of the reddish corolla arched, exceeding the calyx, produced into an elongated subulate beak twice longer than the calyx, nearly straight or more usually becoming strongly recurved upward and almost circinate.—Greenland, Labrador, and from Hudson's Bay to the western side of the Rocky Mountains, and southward to Wyoming and Colorado. East Humboldt, Wahsatch, and Uinta Mountains; 7–9,000 feet altitude; July, August. (819.)

Pedicularis bracteosa, Benth. *DC. Prodr.* 10. 574. Glabrous or with the spike somewhat pilose; stem erect, 1–2° high, leafy; leaves pinnately parted, the segments lanceolate, incisely dentate or pinnatifid; spike elongated (3–8′,) densely many-flowered, the bracts ovate, acuminate and somewhat membranous; calyx-lobes lanceolate-setaceous; galea of the yel-

low corolla slightly incurved, not beaked, hooded above and terminating in an obtuse somewhat 2-toothed projection, lip much shorter.—On the Saskatchewan and in the Rocky Mountains westward, and in Colorado. Uinta Mountains; 8–9,000 feet altitude; July, August. (820.)

PEDICULARIS RACEMOSA, Dougl. *DC. Prodr.* 10. 580. Glabrous; stems numerous, simple or occasionally branching above, ascending, 1–2° high, leafy; leaves short-petioled, narrowly lanceolate, doubly serrate with minute teeth; flowers axillary in a raceme that is loose and leafy at base; calyx cleft above, 2-toothed, the teeth more or less acute; galea of the ochroleucous corolla arched and with a long subulate incurved beak.—Growing in clusters in the damp shade of pines, without radical leaves, deep-green; leaves 2–4′ long, the serratures usually white-glandular; lip dilated, equaling the galea. Mountains of Washington and Oregon Territories, and Colorado. In the Wahsatch and Uintas; 8–9,000 feet altitude; July, August. (821.)

## VERBENACEÆ.

VERBENA HASTATA, L. Widely distributed; through the Eastern States and from Canada to the Saskatchewan; Arkansas, Kansas, and New Mexico; California. Only about cultivated fields in Utah Valley and probably introduced. (822.)

VERBENA BRACTEOSA, Mx. From Wisconsin to Kentucky, and westward to New Mexico, Kansas, and the Upper Missouri, and in Oregon. Found only on the foot-hills about Salt Lake City. (823.)

## LABIATÆ.

MENTHA CANADENSIS, L. From New England to Pennsylvania, Kentucky, Arkansas, and New Mexico, and northward to Newfoundland, Hudson's Bay and the Mackenzie River, and from Washington Territory to California. Truckee, Humboldt, and Ruby Valleys, Nevada, and in the Uintas; 4,500–7,000 feet altitude; July. Stems glabrous below. (824.)

LYCOPUS SINUATUS, Ell. *Gray, in Proc. Amer. Acad.*, 8. 286. (*L. Europæus*, Var. *sinuatus*, Gray.) Throughout the region east of the Mississippi, Canada, and the Saskatchewan Valley, in Arkansas, Nebraska, New Mexico, and from Washington Territory to California. Found only in the Wahsatch Mountains, (American Fork Cañon;) 6,000 feet altitude; August. (825.)

MONARDELLA[1] ODORATISSIMA, Benth. *DC. Prodr.* 12. 190. Stems numerous, 6–10′ high, ascending from a decumbent branched woody base; leaves subsessile, oblong-lanceolate, ½–1′ long, acute at each end, very entire or with a few obscure denticulations, hoary or at length becoming green; outer bracts broadly ovate, very obtuse, colored, (purplish,) equaling the elongated tubular calyces.—Heads of flowers ¾–1′ in diameter; lobes of the rose-colored corolla oblong-linear, 3″ long, often sprinkled as well as the rest of the plant with resinous dots; calyx-teeth and margins of the bracts softly villous. In the mountains from Washington Territory to Southern California. East and West Humboldt Mountains, Nevada, and in the Wahsatch; 8,000 feet altitude; July–September. (826.)

SATUREIA HORTENSIS, L. Unionville Cañon, West Humboldt Mountains, Nevada; doubtless escaped from gardens. The specimens show a 13-nerved calyx, the 3 sinus-nerves of the lower lip being double. (827.)

SALVIA COLUMBARIÆ, Benth. *DC. Prodr.* 12. 349. Annual, herbaceous, erect, 4–18′ high, but little branched; leaves deeply pinnatifid, rugose, hoary-pubescent or rather glabrous, the lobes oblong-linear, obtuse, erose or incisely dentate, the upper lobe scarcely broader; floral leaves bractlike; whorls solitary or in pairs, remote from the leaves, densely many-flowered and hemispherical, 6–12″ in diameter; the bracts broadly ovate, membranous, acuminate and imbricate; upper lip of the ovate pubescent calyx elongated and concave, the lower one shorter; corolla-tube included, the middle lobe of the lower lip crenulate.—Bracts and calyx usually more or less purple Southern California and Western Arizona. Found only in Truckee Pass, Nevada; 4,000 feet altitude; May and November. (828.)

AUDIBERTIA INCANA, Benth. *DC. Prodr.* 12. 359. Canescent or some-

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[1] MONARDELLA, BENTH. Calyx tubular, often elongated, 10–13-nerved, 5-toothed; teeth short, nearly equal, straight, throat naked within.—Corolla-tube equaling the calyx or slightly exserted, the throat glabrous within; somewhat bilabiate, the upper lip 2-cleft, the lower 3-cleft, and the lobes all oblong or linear, flat and nearly equal. Stamens 4, somewhat equal or the lower ones longer, straight, divergent and exserted. Anthers with two parallel cells, becoming divergent or divaricate. Styles very shortly 2-cleft. Nutlets dry.—Annual or perennial, herbaceous or suffrutescent. Verticils large, subglobose, solitary and terminal, surrounded by broad bracts. With nearly the habit and calyces of *Monarda* and corolla of *Pycnanthemum*. BENTH., *in DC. Prodr.*

[1] AUDIBERTIA, BENTH. Calyx ovate, bilabiate, the upper lip concave, entire or shortly 3-toothed, the lower 2-cleft, the throat naked. Corolla-tube equaling the calyx or exserted, bilabiate, the upper lip with two spreading lobes, the lower 3-cleft, the lateral lobes ovate or oblong, spreading, the middle one very broad and emarginate. The fertile stamens ascending and usually exserted, the rudiments of the lower ones small and clavate or none. Anthers dimidiate, with an ascending linear connective, jointed to the filament, bearing upon its summit the linear 1-celled anther, and not produced at base or very shortly acuminate.—Shrubby, villous, or more frequently hoary-tomentose; the whorls usually densely many-flowered, with bract-like floral leaves. BENTH., *in DC. Prodr.*

what pubescent above, 6–15′ high; branches divaricately branched; leaves obovate or obovate-oblong, obtuse or retuse, entire, narrowed at base and short-petioled, ½–1½′ long; floral leaves scarcely larger than the bracts, sessile, broadly ovate or nearly orbicular, ciliate, often purplish; whorls densely flowered, globose, distinct; calyx pubescent, with the oblong obtuse lobes of the lower lip shorter than the broadly rounded entire and very obtuse upper one; corolla pale blue, the tube straight, naked, and glabrous within, twice longer than the calyx, and the lower lip nearly twice longer than the upper one, with the middle lobe very broad, concave, emarginate and denticulate. Oregon, (Douglas;) Western Nevada, (Beckwith, Anderson;) Providence Mountains, Southern California, (Cooper.) Washoe and West Humboldt Mountains, and in Monitor Valley, Nevada; 4,500–6,000 feet altitude; May–August. (829.)

LOPHANTHUS URTICÆFOLIUS, Benth. *DC. Prodr.* 12. 368. Glabrous, erect, 2–4° high; leaves cordate-ovate, crenate or serrate, green upon both sides, obtuse or the uppermost somewhat acute, the floral ones sessile, ovate and acute; bracts few, lanceolate-linear, shorter than the calyx; spike dense, oblong, 2–4′ long; calyx 2–6″ long, incurved, glabrous or puberulent, the throat oblique, the membranous teeth colored, long-subulate-acuminate, the upper ones longest; corolla purple, shortly exserted, the throat slightly inflated and limb short; stamens much exserted.—Mountains of Oregon and California. Very abundant in mountain cañons in Nevada, and also in the Wahsatch and Uintas; 6–8,000 feet altitude; July–September.—There is considerable variation in the length of the calyx and calyx teeth, and a close approach at times to *L. anisatus*, but the leaves are uniformly broad-cordate at base and are rarely whitish beneath. (830.)

NEPETA CATARIA, L. Cañons of the Wahsatch, near settlements; doubtless introduced. (831.)

DRACOCEPHALUM PARVIFLORUM, Nutt. Along the Great Lakes and through Central British America to Great Bear Lake and on the Youkon in Alaska; on the Upper Missouri and southward to New Mexico and Northern Arizona. In the Wahsatch; 5–6,000 feet altitude; May–July. (832.)

BRUNELLA VULGARIS, L. Through the Eastern States to Newfoundland and Canada, and westward on the Saskatchewan; on the western coast from Unalaska and Sitka to the Sacramento River. East Humboldt Mountains,

Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; July–September. (833.)

Scutellaria resinosa, Torr. *DC. Prodr.* 12. 427. Annual, or biennial and somewhat woody at base; pubescent or puberulent, somewhat glandular, much branched from the base, the stems mostly simple, low, (2–12′;) leaves ½–1′ long, short-petioled, broadly ovate or oblong, obtuse, entire or sometimes crenate, rounded or cuneate at base, never cordate, the floral ones similar; flowers axillary, opposite, secund, very variable in size; corolla blue, 2–9″ long, densely villous, attenuate at base, usually more than four times longer than the herbaceous calyx.—Including *S. Drummondii*, Benth. Western Texas, New Mexico and Colorado. West Humboldt and Havallah Mountains, Nevada; 5,000 feet altitude; June–October. (834.)

Scutellaria galericulata, L. From North Carolina northward to Newfoundland, Canada, Saskatchewan and Great Bear Lake; in Oregon and Colorado. Wahsatch Mountains, Utah; 5–6,000 feet altitude; July. (835.)

Salazaria[1] Mexicana, Torr. *Bot. Mex. Bound.*, 133, *t.* 39. Shrubby, 2–3° high; branches slender, spreading or declined, terete, hoary with a minute appressed pubescence; leaves ½–1′ long, ovate or oblong-lanceolate, acute at base, slightly pubescent, 3-nerved; flowers 2–6, short-pedicelled; calyx 2″ long and often nearly as broad, becoming 6″ in diameter in fruit; corolla blue, 6–10″ long, pubescent; style long and filiform, nutlets nearly 1″ in diameter.—Southern Nevada, (Frémont;) Chihuahua, (Parry;) Southern Utah, (Palmer.)

Marrubium vulgare, L. Wahsatch, near settlements. (836.)

Stachys palustris, L. Hirsute throughout; leaves very short petioled. From Newfoundland and the Northern States through Canada to Great Bear Lake, and from Washington Territory to Northern California; Southern California, (? Thurber.) In Truckee and Ruby Valleys, Nevada, and Weber and Provo Valleys, Utah; 5–6,000 feet altitude; July, August. (837.)

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[1] Salazaria, Torr. Calyx tubular-campanulate, without appendages, becoming much enlarged and bladdery-inflated, reticulated; shortly bilabiate, the tips slightly unequal, entire and very obtuse. Corolla-tube long-exserted, recurved-ascending, the throat dilated; limb bilabiate, upper lip concave, entire, the lower broadly convex, emarginate, the lateral lobes short and united to the upper lip. Stamens scarcely exserted; anthers ciliate, the upper 1-celled and cordate. Style long and filiform, entire. Nutlets depressed-globose, minutely tuberculate. Cotyledons incumbent; radicle short.—A much branched shrub; leaves petioled, entire; racemes terminal, few-flowered.

## BORRAGINACEÆ.

LITHOSPERMUM LONGIFLORUM, Spreng. From Southern Texas to Western Illinois, Wisconsin, and the Saskatchewan, and westward to Sonora, New Mexico, Colorado and the Rocky Mountains. Only on the foot-hills near Salt Lake City, rare; 5,000 feet altitude; May. (838.)

LITHOSPERMUM PILOSUM, Nutt. *Pl. Wyeth.*, *Jour. Acad. Phil.*, 7. 43. (*L. ruderale*, Dougl. *Hook. Fl. Bor. Amer.*, 2. 89.) Stems 1–1½° high, herbaceous, strict, numerous from a perennial root, simple or branched above, hirsute, sulcate; leaves 1–3′ long, numerous, sessile, linear or linear-lanceolate, acuminate but mostly pointless, strigose and somewhat hispid; spikes very leafy, short and terminal; flowers nearly sessile; calyx hirsute, 5-parted, lobes unequal, linear; corolla dull greenish-yellow, 3–4″ long, villous, the broad cylindrical tube equaling the calyx, the lobes rounded ovate; throat naked but with somewhat prominent folds; nutlets large, 2″ in length.—A well-marked species, but including *L. Torreyi*, Nutt., *l. c.*, as represented by an original specimen in Herb. Torrey. Washington Territory, (Douglas, Wyeth.) Frequent in the lower cañons, from the Washoe Mountains, Nevada, to the Wahsatch; 5–6,500 feet altitude; May–July. (839.)

295 Parry and 441 Hall & Harbour, (referred to this species,) are the same as 627 Fendler, (*L. multiflorum*, Torr., Ms. in Herb.,) 1562 Wright, at least in part, and 442 Frémont, 1843, having slender branched stems 1–1½° high, with broadly linear subacute leaves, the yellow flowers nearly sessile in terminal elongated racemes, 6″ long, the tube much exceeding the linear sepals; nutlets 1½″ long, smooth and shining, (dull and scabrous in one of Wright's specimens.) This seems to be the *L. incisum*, Torr., of James's collection. *L. decumbens*, Torr., of that collection, is *L. hirtum*, Lehm.

MERTENSIA OBLONGIFOLIA, DC. *Gray's Revis. Mert.*, *Sill. Jour.*, (*n. s*,) 34. 340. Stems low (4–8″ high,) smooth, suberect; leaves oblong or spatulate-lanceolate, for the most part obtuse; calyx 5-parted or deeply 5-cleft, the segments lanceolate or linear, acute, ciliate or nearly smooth, about half the length of the corolla-tube, which is glabrous within and 2–3-times longer than the 5-cleft limb; filaments dilated, as broad as the anthers or broader, but less in length.—Leaves nearly glabrous, often somewhat glaucous, more or less scabrous upon the margin with short stiff curved hairs, and occasionally roughish with similar hairs upon the upper surface; panicle short and crowded; flowers sometimes white. An early flowering species, growing on

moist slopes. In the mountains from Idaho to Colorado and Utah. Frequent in the Washoe, Trinity and East and West Humboldt Mountains, Nevada; 6–9,000 feet altitude; April–July. (840.)

Var. Somewhat taller, 10–12′ high, with the flowers more loosely panicled; but for the obtuse leaves, approaching the smaller forms of *M. Sibirica.* East Humboldt Mountains, Nevada; 7,000 feet altitude; July. (841.)

Mertensia Sibirica, Don. *Gray, l. c.*, 340. Usually tall, 1–5° high, glaucescent, glabrous or subpubescent; cauline leaves ovate or ovate-lanceolate or often oblong-lanceolate, acute or acuminate; calyx 5-parted, the lobes oblong or oblong-linear, obtuse, ciliate, 2–4-times shorter than the tube of the corolla, which is sparingly pilose or almost glabrous within; limb of the corolla 5-cleft, more than half longer than the tube; filaments dilated, shorter than the anthers.—Mostly confined to the banks of mountain-streams, and quite variable; the taller specimens have often the leaves 6′ or more in length and 2–3′ broad, more or less petioled; in the lower ones they are more usually oblong-lanceolate and mostly sessile; panicles loose; pubescence as in the last; corolla 4–6″ in length. Rocky Mountains of Colorado and Wyoming, and probably northward. In the East and West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–9,000 feet altitude; June–August. (842.)

Mertensia paniculata, Don. Identical in foliage and habit with the last, but distinguished by its general roughness (varying in degree,) and by its lanceolate acute calyx-segments.—The extreme forms of the two species are sufficiently distinct, but numerous intermediate states can be referred as well to one as the other. All the specimens of the collection with elongated and acute calyx-lobes are placed here, whatever the degree of pubescence. Shore of Lake Superior, Rocky Mountains of Colorado and Wyoming, and northward; Behring Strait. Battle and Toyabe Mountains, Nevada, and in the Wahsatch and Uintas; 5–7,000 feet altitude; May–August. (843.)

Var. nivalis. A reduced alpine form, 3–6′ high; hirsutely pubescent throughout, especially so upon the oblong-lanceolate calyx-lobes; leaves oblong, acute, the lowest petioled, the uppermost ovate and clasping. Uinta Mountains; 10–12,000 feet altitude; August. (844.)

Mertensia brevistyla. Low (4–10′,) pubescent with short appressed rigid hairs, the lower surface of the leaves excepted; leaves oblong or oblong-lanceolate or oblanceolate, very obtuse: flowers in a loose panicle: calyx

deeply 5-cleft or 5-parted, very hirsute, lobes oblong- or ovate-lanceolate, usually acute; corolla-tube short, equaling or but little exceeding the calyx, and rarely as long as the deep-blue limb; anthers inserted near the base of the tube, and included within it; style very short.—This was collected by Frémont in 1844 on Spanish Fork in the Wahsatch; by Stansbury, also in the Wahsatch; by Burke in Southern Idaho, and by Hall & Harbour (443) in Colorado. It is a pretty species, of peculiar habit, growing on rather dry slopes; placed by Dr. Gray under *M. alpina*, but the differences are so constant and obvious that it seems to deserve higher rank. In the Wahsatch and Uintas; 5–7,000 feet altitude; May, July. PLATE XXIII. Fig. 1. Flowering stem; natural size. Fig. 2. Flower, laid open; enlarged six diameters. (845.)

AMSINCKIA[1] LYCOPSOIDES, Lehm. *DC. Prodr.* 10. 117. Very hirsute, erect, 2′–3° high, simple or branched; leaves ovate-, oblong- or linear-lanceolate, acute or obtuse, becoming white-papillose-scabrous with age; corolla 2–5″ in length, the deep-orange limb rather narrow, the throat pilose or glabrous, and the filaments variously inserted upon the tube.—The numerous specimens are so exceedingly variable in habit, foliage, position of the stamens and other characteristics of the flower, that it becomes unavoidable to include in this species both *A. Mexicana*, Mart. & Gal., and *A. intermedia*, and perhaps also *A. spectabilis*, Fisch. & Mey., and the Chilian species *A. angustifolia*, Lehm., as has already been suggested by both Dr. Torrey and Dr. Gray. From Washington Territory to Sonora, Arizona and Utah. Frequent on dry slopes from the Washoe Mountains to the Wahsatch; 4–6,500 feet altitude; April–July. (846.)

PIPTOCALYX[2] CIRCUMSCISSUS, Torr. (*Lithospermum*, H. & A. *DC. Prodr.* 10. 84.) Very hispid with white rigid hairs; stems numerous, branched, ascending, 1–2′ high; leaves 2–4″ long; the deciduous portion of the 5-angled calyx about 1″ long; corolla very small, white, scarcely exceeding the calyx;

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[1] AMSINCKIA, LEHM. Calyx 5-parted. Corolla salver-form, plicate in æstivation but without scales, the tube narrow and usually much longer than the lobes. Stamens with very short filiform filaments. Style elongated, included. Nutlets 4, narrow-ovoid, more or less triangular, attached to the style to above the middle. Seeds exalbuminous, the radicle superior, and the obovate cotyledons 2-parted.—Annual, hispid, with alternate entire leaves and racemose spicate ebracteate yellow flowers.

[2] PIPTOCALYX, TORR. Calyx 5-cleft, circumscissile above the base, deciduous. Corolla salver-form, the throat with 5 folds or gibbæ but without scales. Stamens included. Nutlets 4, triangular-ovate, attenuated above, glabrous and shining, attached to the axis the whole length.—Annual, dwarf, with linear alternate leaves, the minute flowers in terminal leafy scorpioid racemes.

stamens with very short filaments, inserted upon the middle of the tube; nutlets very nearly smooth upon the back.—Beautifully figured in the unpublished plates of the Wilkes's Exploring Expedition. Collected by Tolmie and Burke in Southern Idaho and by Stansbury in Southwestern Wyoming. It is also 376 Frémont, from the Mohave Valley, Southern California, and 162 Anderson and 332 and 336 Torrey, from Western Nevada. On the Pah-Ute Mountains, Nevada, and on the shore of Antelope Island, Utah; June. (847.)

Var. Stems 2–5, erect and simple, ½–2′ high. Probably only an early form of the species. Found near Carson City, Nevada; April. (848.)

ERITRICHIUM[1] VILLOSUM, DC. *Prodr.* 10. 126. Stems 3–6′ high, loosely branched at base and cæspitose, rooting below, the flowering shoots elongated, leafy, erect, pubescent; leaves elliptic-oblong, acute, sparingly villous with long silky hairs, racemes in pairs, erect, several-flowered, bracteate at base; nutlets truncate upon the back, which is surrounded by a margin of inflexed ciliate-serrate teeth. Var. ARETIOIDES, Hook. Dwarf, 3″–2′ high, densely cæspitose and covered with soft silky hairs; lower leaves crowded, cauline few; tube of corolla scarcely exceeding the calyx, limb bright blue, 1–3″ in diameter; nutlets nearly 1″ in length, concave upon the back, the toothed margin conspicuous.—Probably biennial. Rocky Mountains of Colorado. Uinta Mountains, Utah; 12,000 feet altitude; August; the flowers considerably smaller than is usual in the Colorado specimens. (849.)

ERITRICHIUM ANGUSTIFOLIUM, Torr. *Pac. R. R. Surv.* 5. 363. (*Williamson's Rep.*) Annual, very hispid with mostly spreading hairs; stem 3′–1° high, suberect, branched; leaves linear or narrowly oblong, obtuse; racemes terminating the branches, usually bifurcated and at length elongated, frequently short and subcapitate; flowers sessile, bractless; calyx (2–3″ long in fruit) very hispid with yellowish hairs, the lobes narrowly linear; corolla white, ½–1″ long, the stamens inserted near the base on very short filaments; nutlets (1–4) oblong, acute, nearly 1″ long, convex and very minutely granulated upon the back, attached to the style to the middle by a ventral groove.—

[1] ERITRICHIUM, SCHRAD. Calyx 5-parted. Corolla salverform, the throat closed by small obtuse scales. Stamens and style included. Nutlets 4, attached laterally, (usually) near the base, the surface of insertion very narrow, imperforate at base, flat (or convex) anteriorly, the angles smooth or rarely crenate.—Mostly annual, with entire and commonly alternate leaves, the usually very small blue or white flowers in lateral or axillary spicate racemes. Differing from *Myosotis* in the quincuncial æstivation of the corolla and the more or less lateral insertion of the nutlets, which are also usually rugose or granulate upon the back, and from *Echinospermum* in the attachment of the nutlets (in most cases) not extending above the middle of the style, the nutlets not dilated below, prickles rare and not barbed, and the attachment of the seed ventral and not at the apex. DECANDOLLE, *Prodromus*.

Southern California, Arizona and Sonora, probably as far northward as Oregon. Frequent on the foot-hills and in the dry valleys from the Trinity Mountains to the Wahsatch; 4,300–5,000 feet altitude; May, June. (850.)

ERITRICHIUM CALIFORNICUM, DC. *DC. Prodr.* 10. 130. Root slender, annual; stems weak, simple or usually diffusely branched, ascending, decumbent or prostrate; pubescence appressed, strigose; leaves linear or narrowly oblong, acute or obtuse, ciliate, occasionally opposite and subsheathing; racemes leafy at base, becoming much elongated; flowers sessile or upon very short pedicels; calyx 5-parted, lobes lanceolate or linear, about equaling the corolla, enlarging and spreading and subfoliaceous in fruit; corolla white, with 5 yellow 2-parted scales on the throat, the lobes of the limb very obtuse; nutlets triangular, rugose.—A quite variable species, growing in muddy and usually subalkaline localities; stems ½′–1° in length, the calyx ordinarily very hispid with yellowish hairs. *E. Chorisianum* and *E. Scouleri*, with longer pedicelled flowers, are considered a variety. *E. connatifolium*, Kell., is doubtless the same. From Washington Territory to Southern California, Arizona, (Ives,) Colorado, and Northern Dakota, (Nicolet.) Frequent from the Washoe Mountains to the Wahsatch, both in the valleys and in the high cañons; 4–9,500 feet altitude; April–September. (851.)

ERITRICHIUM GLOMERATUM, DC. *DC. Prodr.* 10. 131. "Perennial" or at least biennial; stem simple, erect, 6–18′ high, usually solitary and rather stout and rigid, very hirsute with spreading hairs, leafy especially at base; leaves 2–4′ long, alternate, oblong- or linear-spatulate or oblanceolate, subacute, hirsute and usually more or less appressed-pubescent; spikelets 5–7-flowered, lateral, axillary, clustered, more or less peduncled and usually bifurcated or the upper ones sessile, often forming a narrow elongated spike-like raceme, the subtending leaves often elongated-linear and conspicuous, as are also the bractlets; flowers 2–4″ long, nearly sessile; calyx very hispid, 5-parted, the linear-lanceolate lobes equaling the corolla-tube, becoming much enlarged in fruit; limb of the white corolla broad and expanded, the truncated scales of the throat conspicuous; nutlets large, (1½″ long,) ovate and narrowed above but obtuse, more or less rugose and tuberculated, especially upon the back, which is surrounded by an acute slightly raised margin, sulcate ventrally and attached to the elongated style to the middle.—A stout coarse species, well-marked though somewhat variable. From Arizona (Ives) and New Mexico northward to the Saskatchewan. Not seen in Nevada, and

found only in the Uintas and in Bear River Valley, Utah; 6–7,000 feet altitude; July. Plate XXIII. Fig. 6. A spikelet; natural size. Fig. 8. Calyx, with matured fruit; enlarged two diameters. (852.)

Var. (?) fulvocanescens. Low, subcæspitose and certainly perennial; stems several, 1–8′ high, erect or ascending, hirsute; leaves ½–2′ long, obovate or oblong-spatulate with very narrow petioles, obtuse, tomentose with a soft silky pubescence and hirsute; raceme short and terminal or compound, ½–3′ long, the clusters few–several-flowered, densely hirsute with yellow or brownish hairs, the flowers distinctly pedicelled and frequently subumbeled, with inconspicuous narrow-lanceolate or more frequently ovate and obtuse or sometimes obsolete bractlets; flowers turning brown in drying and with the fruit nearly as in the last, but the calyx-lobes rather narrower and less enlarged in fruit.—Very probably a distinct species, but it seems sometimes to approach small forms of the last too nearly. It is 632 Fendler, from New Mexico, (*E. fulvocanescens*, Gray, Ms. in Herb.,) and 467, 522 and 577 Frémont, (1844,) probably collected in Utah. Frequent in the mountains through Nevada, from the base to nearly the highest peaks, and also found in the Wahsatch; 5–11,000 feet altitude; May–September. Plate XXIII. Fig. 7. A spikelet; natural size. (853.)

Eritrichium Kingii. Annual, hispid with spreading hairs, erect, branched, 4–8′ high; leaves broadly spatulate, obtuse, alternate, the upper oblong or ovate, sessile and clasping; flowers in terminal somewhat bifurcate racemes, very shortly pedicelled, the lowermost only bracted; calyx hirsute with yellow hairs, 5-parted, the lobes oblong, obtuse, equaling the corolla-tube; corolla white, the limb broad (3–4″) and expanded, the throat with conspicuous obtuse scales; nutlets 1½″ long, ovate, obtuse, rugosely verrucose, attached to the very short style above the base, not at all margined upon the back but the edge rounded.—Allied to the preceding, but very distinct. In Truckee Pass and in the Trinity Mountains, Nevada; 4,500–6,000 feet altitude; May. Plate XXIII. Fig. 3. A plant; natural size. Fig. 4. Flower, laid open; enlarged four diameters. Fig. 5. Calyx and mature fruit; enlarged two diameters. (854.)

Eritrichium fulvum, A. DC. *DC. Prodr.* 10. 132. (*Myosotis tenella*, Nutt., Ms.) Annual, low (1–10′) and slender, hirsute with mostly spreading hairs; stems usually solitary, erect, branched from the base or more commonly simple and loosely panicled above; leaves mostly radical, rosulate,

sessile, oblong-lanceolate, subacute, ½–1′ long, the radical ones more or less glabrous beneath, the cauline distant; racemes elongated or crowded; calyx 5-parted, densely hirsute with brownish yellow hairs, lobes lanceolate, acute, about equaling the corolla-tube; corolla white or pinkish, the limb 1½–3″ broad, exceeding the tube, the throat with 5 prominent scales; nutlets rugose, and granulate-tuberculate between the ridges.—The matured fruit, seen only in specimens collected by Stretch near Washoe City, is broadly ovate with an abrupt broad strongly incurved apex, somewhat tuberculate-cristate and also tuberculate-margined, obscurely transversely rugose. The only difference to be found between this and numerous specimens of *Plagiobotrys canescens*, Benth., is in the somewhat more strongly rugose fruit of the latter, and there can be little doubt that the two species should be united. California to Washington Territory. Foot-hills near Carson City; April. (855.)

Eritrichium micranthum, Torr. *Bot. Mex. Bound.*, 141. Annual, low (2–4′,) canescently hispid; stem much and diffusely branched from the base upward; leaves linear, obtuse, 3–6″ long; racemes short, long-bracted; flowers crowded; calyx-lobes linear; corolla very minute, the throat naked; nutlets oblong, rather acute, very glabrous, convex upon the back, the internal angle prominent and sulcate.—The flowers are in short subcapitate racemes, sessile, shorter than the foliaceous linear bracts; corolla white, less than 1″ long, remaining calyptra-like after fading, the narrow tube equaling the calyx, without appendages, the lobes small and ovate; nutlets ½–⅔″ long, shining, adherent to the slightly longer style by the whole inner angle, in this respect holding an extreme place in the genus. Indeed it does not differ from the genus *Krynitzkia*, as was observed by Dr. Torrey, except in its persistent calyx, while the point of attachment of the seed within the achenium is even higher than in *K. leiocarpa*. But a deciduous calyx is by no means a constant character in that only species of that genus, and as the recognized *Eritrichiums* vary considerably among themselves in the mode of attachment of the seed, and of the achenium to the style, there seems to be too little ground for the separation of these two species. Western Texas and New Mexico. Found on the sandy shore of Stansbury Island in Salt Lake; June. The roots afford a rich purple dye. (856.)

Eritrichium leiocarpum. (*Krynitzkia*, F. & M., *DC. Prodr.* 10. 134. See remarks under the last species.) Annual, 6–18′ high, hispid with more or less spreading hairs, diffusely branching from the base, the branches elon-

gated, weak and slender; leaves ½–1′ long, oblong or oblong-linear; racemes terminal, short, usually bractless; flowers almost sessile; calyx-lobes linear becoming much elongated, often very hispid; corolla white, minute, (less than 1″ long,) throat somewhat gibbous or scarcely so; nutlets oblong- or ovate-triangular, 1″ long, perfectly glabrous and shining, rather flattened upon the back, the internal angle sulcate and attached nearly its whole length to the short style; calyx, with the fruit, often deciduous.—Closely allied to the last, but larger and much more loosely branched, and especially marked by its bractless and rarely at all capitate racemes. It varies much in the size and development and hairiness of the calyx, and apparently also in the prominence of the protuberances in the throat of the corolla. Early specimens with a short calyx (857) and the maturer form with the calyx well-developed (858) show wide extremes. *E. muriculatum*, Torr., *Bot. Wilkes's Exped., ined., t.* 13., (not of DC.,) is apparently in every respect the same thing, even to the deciduous calyx, except that the nutlets are very minutely granulated, with coarser scattered tubercles. The fruit of the present specimens shows under the microscope a very obscurely granulated surface, so that the difference is probably not constant. Southern California to Washington Territory. On the foot-hills and mountains from Western Nevada to the Wahsatch; 4–7,000 feet altitude; May–August.

Eritrichium pterocaryum, Torr. *Bot. Wilkes's Expl. Exped., ined., t.* 13. Annual, 4′–1° in height, hirsute with spreading hairs, erect, branched; leaves linear or narrowly oblong, ½–1½′ long; racemes terminal, usually bifurcate; flowers nearly sessile, rather crowded; calyx-lobes 1½–2″ long, ovate or oblong, acute, densely hirsute with short yellow hairs; corolla white, small, the tube about equaling the calyx, with minute appendages; nutlets broadly ovate with a wide membranous irregularly crenate wing, or one of the nutlets oblong and wingless, strongly tuberculate upon the back and with a deep ventral groove, attached to the style the whole length.—A remarkable species with the wing of the fruit as broad as the body. Oregon, Northern Arizona, New Mexico, and Western Texas. Frequent on the foot-hills of the Washoe and Trinity Mountains, Nevada, and also found on Stansbury Island in Salt Lake; May, June. (859.)

Echinospermum deflexum, Lehm. *DC. Prodr.* 10. 135. Biennial; stem erect, terete, fistulous, branched, villous with spreading hairs; leaves oblong-lanceolate, rather obtuse, ciliate at base, hirsute-pubescent; racemes

erect-spreading, bracteate below, with deflexed pedicels; calyx-lobes ovate, shorter than the corolla; nutlets compressed, with a single marginal row of barbed prickles, which are connate at base, the dorsal surface granulate and shortly pilose. Var. FLORIBUNDUM. (*E. floribundum*, Lehm.) Usually taller (2–4° high) than the European and Siberian form, the leaves acute or obtuse, and the dorsal surface of the nutlets variable, either nearly smooth, especially in the younger fruit as figured in the *Flora Bor.-Amer.*, or pilose, or coarsely granulate with the tubercles often pilose, and frequently with a few scattered imperfectly developed barbed prickles.—The central longitudinal ridge is more or less distinct and the marginal prickles vary in number and breadth. The flowers are either light blue or white, 2–7″ in diameter. From New Mexico to the Saskatchewan and west to Northern California and Washington Territory. Frequent in the mountains from the Havallah range to the Wahsatch; 5–8,000 feet altitude; May–August. (860.)

ECHINOSPERMUM REDOWSKII, Lehm. *DC. Prodr.* 10. 137. Stem erect, pubescent, paniculately branched; leaves linear or sublanceolate, hoary with spreading hairs; calyx-lobes narrow-linear, equaling the corolla-tube; nutlets compressed, surrounded by a single row of barbed prickles, muriculate-rugose upon the back and sides, shorter than the enlarged calyx. Var. OCCIDENTALE. (*E. Redowskii*, Gray.) The tubercles, which are irregularly and thickly scattered over the faces of the nutlet, very sharply acute instead of rounded-obtuse as in Asiatic specimens.—Quite variable in its habit; from 3′–2° high, much branched at base and ascending, or with a single erect virgate stem; leaves and bracts usually linear-oblong, not unfrequently ovate-oblong or spatulate, always obtuse; flowers small, but little exceeding the calyx, blue; the prickly margin more or less contracted over the back of the nutlet, and the prickles more or less confluent. *E. patulum*, Lehm., of Western Asia, to which this plant was at first referred, differs from *E. Redowskii* (as shown by specimens in Herb. Gray.) only in the tuberculations upon the fruit, which in the former species are few in number, arranged regularly in longitudinal rows upon the back and upon the outer edge of the sides, and armed with curved points. The differences are represented with tolerable accuracy in the plate. From Western Texas to Arizona and northward to the Saskatchewan, Bear Lake and Fort Youkon. Frequent in the valleys and on the mountains from the Sierras to the Wahsatch; 4–8,000 feet altitude; May–July. PLATE XXIII. Figs. 9, 10. Achenium of *E. Redowskii*, Var. *occident-*

PLATE [illegible]III

*ale.* Figs. 11, 12. Achenium from Asiatic specimen of *E. Redowskii.* Figs. 13, 14. Achenium of *E. patulum*; all enlarged eight diameters. (861.)

Var. STRICTUM. (*E. strictum*, Nees., *App. Neuwied's Trav.* 17; not of Ledebour.) The prickles united over the back into a strongly inflexed border.—An extreme state, but various intermediate forms are frequent. New Mexico to Colorado and westward. Valleys and foot-hills of Western Nevada, with the last. (862.)

COLDENIA[1] HISPIDISSIMA, Gray. *Proc. Amer. Acad.* 5. 340. (*Eddya*, Torr. *Pac. R. R. Rep.* 2. 170, *t.* 8.) Prostrate, much-branched, very hispid; branches 3–10′ long, from a woody base; leaves 3–5″ long, linear, entire, revolute, acute, somewhat fascicled at the ends of the short branchlets, hispid with rigid white hairs; flowers solitary; calyx deeply 5-parted, lobes linear, tube indurated in fruit; corolla white, 2–3″ long, salver-form, without scales;

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[1] COLDENIA, L. (Including *Stegnocarpus*, Torr., *Eddya*, Torr., *Tiquilia*, Pers., and *Galapagoa*, Hook.) Calyx 5-parted or 5-cleft. Corolla funnelform, lobes subrounded, flat and spreading, throat naked. Stamens 5. Style bifid or 2-parted, short or elongated. Nutlets 4, coherent into a globose or 4-lobed fruit, at length separable, or more or less distinct. Albumen none or thin; embryo straight, or the rounded or ovate entire or 2-parted cotyledons incumbent upon the ascending radicle.—Shrubs or herbs, with alternate leaves and small sessile usually axillary flowers.

Dr. Gray (in *Proc. Amer. Acad.* 5. 340) has proposed the following arrangement of the species that have been referred to this genus:—

I. Fruit of 4 triangular nutlets, convex upon the back and closely united by their flat inner surfaces, thick and crustaceous.

§ 1. EUCOLDENIA, DC. Styles 2, short; fruit 4-lobed-globose; nutlets subconnate in pairs, at length separable. C. PROCUMBENS, L. Southern Asia.

§ 2. STEGNOCARPUS, DC. Style 2-cleft; fruit globose, separating into 4 nutlets. C. CANESCENS, DC. (*Stegnocarpus*, Torr. *Pac. R. R. Rep.* 2. 169, *t.* 7.) Northern Mexico and New Mexico.

II. Fruit deeply 4-lobed, the 4 nutlets (or fewer by abortion) ovate, small, attached only to the style by the inner angle, the pericarp thin.

§ 3. EDDYA, Torr. Style bifid toward the top; nutlets rough-papillose, with a thin crustaceous pericarp. C. HISPIDISSIMA, Gray.

§ 4. TIQUILIA, Pers. Style 2-cleft or divided; nutlets smooth, shining, with a very thin crustaceous pericarp; embryo with flat entire cotyledons, as in the preceding sections. Species three, all South American.

§ 5. TIQUILIOPSIS, Gray. Corolla-tube with 5 scales at the base; pericarp almost membranous; cotyledons 2-parted, accumbent to each side of the radicle; otherwise as in the last. C NUTTALLII, Hook

Another species has recently been added to the last section on account of its likeness in habit to *C. Nuttallii*, but without a knowledge of its fruit. The fuller description here given shows that it differs considerably from them all. The true relations of these rather heterogeneous species are not certain, but it would seem that all the latter division should rather be referred to the tribe *Borrageæ* than to the *Heliotropeæ*, as was long ago stated by Dr. Torrey.

C. PALMERI, Gray. *Proc. Amer. Acad.* 8. 292. (*Tiquilia brevifolia*, Var. *plicata*, Torr. *Bot. Mex. Bound.* 136.) Shrubby, much-branched and spreading, 1° high, hoary with a short dense soft appressed pubescence without hirsute hairs; leaves 2–3″ long, ovate, about equaling the petiole, thickly plicate-nerved; calyx short, 5-cleft, the ovate or lanceolate lobes about equaling the tube; corolla white, 3″ or more in length, the tube twice exceeding the calyx, without scales at the base; stamens included, the unequal dilated filaments inserted at the base of the tube and adnate nearly their whole length; style as long as the corolla or exserted, very deeply cleft; fruit maturing but a single obovate-globose smooth nutlet, attached at the base and without ventral sulcus; albumen evident; cotyledons rounded, flat, entire, incumbent upon the shorter radicle.—Southern California, (Schott;) Arizona, (Palmer.)

stamens inserted near the top of the tube, unequal, included; style about equaling the stamens, cleft one-third its length; nutlets globose-ovate, attached by the inner angle, dull-gray, minutely papillose, scarcely ⅓″ in width; pericarp thin and brittle; albumen none or very thin; cotyledons ovate, entire; radicle very short.—Western Texas, New Mexico, Northern Arizona, and Southern Utah, (Palmer, 1870.)

COLDENIA NUTTALLII, Hook. (*Tiquilia brevifolia*, Nutt. *Bot. Mex. Bound.* 136.) Annual, prostrate, diffusely branched, densely pubescent and hirsute with stiff white hairs; stems 3–15′ long; leaves 2–3″ long, equaling the petioles, ovate or rhomboidal, entire, strongly plicate-veined, margins revolute, somewhat fascicled; flowers numerous in axillary and terminal clusters, with narrow-subulate bractlets; calyx deeply 5-cleft, 1–2″ long, the lobes linear and hirsute; corolla white, 2″ long, funnelform with spreading lobes, with 5 scales at the base of the tube; stamens with very short filaments, inserted in the throat; style included; nutlets ovate, ½″ long, smooth and shining, free at base and attached only to the style by a ventral sulcus nearly its whole length; albumen none; cotyledons 2-parted, accumbent to the radicle on each side.—Excellently figured in *Bot. Wilkes's Exped.*, *ined.*, *t.* 12. Southern California and Arizona; Oregon, (Wilkes, Geyer;) near Carson City, (339 Torrey.) Truckee and Carson Deserts and in Unionville Valley, Nevada; 4–5,000 feet altitude; June–August. (863.)

HELIOTROPIUM CURASSAVICUM, L. Virginia to Florida on the seacoast, and in saline or alkaline localities westward to Southern Illinois, Dakota, Oregon, California and Mexico. Truckee, Humboldt and Jordan Valleys, Nevada and Utah; 4–4,500 feet altitude; May–August. Stems prostrate or ascending; flowers white. (864.)

## HYDROPHYLLACEÆ.[1]

HYDROPHYLLUM MACROPHYLLUM, Nutt. Ohio, Indiana, and Kentucky.—Var. OCCIDENTALE. Very variable in the degree of hispidness, in the size and section of the leaves, in the length of the peduncles and denseness of the inflorescence, and tending toward *H. capitatum*, from which it may be distinguished by its usually larger size, the oblong-lanceolate leaves (4–8′

[1] The determinations under this order are due to Dr. JOHN TORREY, (except in the very few cases where it is otherwise indicated,) and the descriptions of the new species were made with the aid of notes and sketches kindly furnished by him.

long) with six pairs of leaflets, the peduncles about equaling or exceeding the leaves, and the hispidness of the calyx rather less dense; flowers blue. It is the *H. capitatum*, Var., of Whipple's Report, 1176 Brewer and 4928 Bolander from California, and 641 Fendler from New Mexico. Specimens from the Wahsatch, near Salt Lake City, have oblong-leaflets, 1–2′ long, coarsely laciniate-lobed. (865.) Others from the West Humboldt Mountains, Nevada, have broadly ovate leaflets, less than 1′ long, often cordate at base, the lobes few and short. (866.) 5–7,500 feet altitude; May, June.

HYDROPHYLLUM CAPITATUM, Dougl. *DC. Prodr.* 9. 289. Low, 6′ in height; stem and leaves pubescent or sometimes slightly hispid; leaves ovate in outline, 2–3′ long, upon elongated petioles, with about 2–3 pairs of coarsely-lobed segments; flowers in dense sessile or short-peduncled heads, considerably shorter than the leaves; calyx very hispid-pubescent; corolla blue; root fasciculate.—Oregon and Washington Territory, (371 Frémont, 326 Geyer, &c.) In the cañons of the Wahsatch, where it was also collected by Stansbury; 5–7,000 feet altitude; June. (867.)

Var. ALPINUM. In dense clusters, the leaves concealing the almost subterranean inflorescence, which is rather looser and with the more linear lobes of the calyx less densely hirsute; pedicels umbellate and occasionally thickened toward the base, reflexed in fruit, some of the flowers abortive and caducous.—East Humboldt Mountains, Nevada; rocky ridge at 9,000 feet altitude; July. (868.)

NEMOPHILA PARVIFLORA, Dougl. Diffuse, more or less pilose throughout with spreading hairs; stems slender, decumbent or ascending, and with the peduncles retrosely prickly; leaves opposite or alternate, ovate in outline, pinnatifid, the 3–9 (mostly 5) lobes ovate or oblong, 1–6″ long, acute, entire or sometimes 1-toothed, the lower lobes more distinct; peduncles about equaling the leaves, opposite to them when the leaves are alternate, turned downward when in fruit; appendages of the calyx very short, or sometimes conspicuous; corolla 1–2″ long, scarcely exceeding the calyx, tubular, 5-cleft, the obovate emarginate lobes often pilose at the apex; ligules 2 at the base of each filament, very small; capsule somewhat hairy, 2″ in diameter, the placentæ 2-ovuled, or in Var. *pluriovulata*, Torr., (*N. pedunculata*, Benth.,) with the seeds numerous and tuberculate.—From Washington Territory to Southern California. The present specimens differ from the ordinary forms in the wholly alternate leaves, the longer narrow leaflets,

and the conspicuous appendages of the calyx; the solitary seeds globose, reddish, nearly glabrous, obscurely pitted. Wahsatch and Uinta Mountains; 6–7,500 feet altitude; June and July, in fruit only. (869.)

PHACELIA CIRCINATA, Jacq. *DC. Prodr.* 9. 298. Perennial, hispid; stems erect or ascending, 6 18′ high, branching or subsimple; leaves petioled, 1–3′ long, simple or pinnate, the 3–5 (rarely 7) leaflets distinct or the uppermost confluent, the terminal one much the larger, ovate to narrow-lanceolate, acute, entire or obscurely serrulate, usually strongly nerved; racemes at first densely flowered; calyx-lobes oblong or linear, acute, erect; corolla blue or nearly white, 2–3″ long, somewhat exceeding the calyx; stamens exserted; capsule 2″ long, erect-hairy; seed often solitary, 1″ long, deeply pitted.—From Washington Territory to Southern California, and eastward to Nebraska and New Mexico. The more common eastern form, stout and erect, the stem often solitary, was found only in the Wahsatch and Uintas; 5–7,000 feet altitude. (870.) The form prevalent in the mountains of Nevada, and also found on Antelope Island in Salt Lake, and in the Uintas, is much smaller, rarely 1° high, the stems ascending, and the leaves rarely pinnate; 5–9,000 feet altitude; May–September. (871.)

PHACELIA HUMILIS, T. & G. *Pac. R. R. Rep.*, (*Beckwith.*,) 2. 122, *t.* 7. Annual, low (3–7′,) hirsute-pubescent or rough-puberulent, usually diffusely branching from the base; leaves oblong-spatulate or lanceolate, attenuate into a short petiole, simple and entire, 1–2′ long; racemes densely flowered; calyx-segments linear, obtuse, hispid, a little shorter than the corolla or but half as long; corolla deep-violet, 2–3″ long, plicate at base between the filaments; stamens exserted, the filaments sparingly hispid above; style glabrous; capsule 4-seeded, ovate, acute, 1½″ long; seed 1″ long, minutely pitted.—Sierras ot California, (Beckwith, 6382 Bolander;) near Carson City, Nevada, (Stretch, Anderson.) Found in a cañon of the Havallah range, Nevada; 5,500 feet altitude; June. (872.)

PHACELIA INTEGRIFOLIA, Torr. *DC. Prodr.* 9. 299. Annual, erect, 4–15′ high, branching above and sometimes at the base, viscidly glandular-pubescent; leaves 1–2′ long, varying from oblong to ovate, cordate or truncate at base, simple and crenately dentate or doubly serrate, or sometimes (1579 Wright) more or less deeply pinnatifid and the segments often toothed, the upper at times nearly sessile; sepals ovate, ciliate-hispid and glandular; corolla-segments oblong, the appendages short and encircling the base of the

filaments; stamens exserted, naked; style united to the middle; ovary oblong, hairy; capsule globose, minutely pubescent and glandular, equaling or slightly exceeding the calyx; seeds 4, minutely warted on the back and transversely ridged on the face.—From the Platte (James) to Northern Texas, (Pope,) New Mexico, and Chihuahua, and collected by Beckwith in Humboldt Valley, Nevada; Southern Utah, (Palmer.)

PHACELIA CRENULATA, Torr. Annual, erect, 1° high, branching above, hispid-pubescent and somewhat glandular; leaves oblong, pinnatifid, the 8–12 oblong segments incisely toothed, ciliate; flowers in terminal compound racemes, which are dense and slowly evolved; pedicels much shorter than the calyx, which is less than half the length of the corolla; sepals linear-lanceolate; corolla rotate-campanulate, 3–4″ long, of a deep-violet color, the lobes crenulate; the stamens and deeply bifurcate style long-exserted, filaments naked; capsule globose, 1½″ in diameter; seeds 4, finely punctate.—Trinity Mountains, Nevada; 4,500 feet altitude; May. (873.)

PHACELIA TANACETIFOLIA, Benth. *DC. Prodr.* 9. 299. Annual, 3′–2° high, suberect, branches lax and slender, more or less hispid or scabrous-pubescent or the stem and branches glabrate; leaves variable, 2–6′ long, 1–2-pinnatifid, the 3–7 pairs of segments oblong and incised dentate; calyx-lobes linear or lanceolate, usually dilated and foliaceous above, very pilose, especially on the margins; corolla campanulate, 3″ long, scarcely exceeding the calyx, the appendages small and encircling the filaments; style bifurcate to below the middle, hairy at base; ovary hairy, 4-ovuled; capsule nearly 2″ long, ovate, acute, pubescent; seeds nearly 1½″ long, pitted.—From Western Texas and New Mexico to Southern and Central California; Western Nevada, (Stretch and Anderson.) Lower cañons and stream-banks of the East and West Humboldt Mountains and in Reese Valley, Nevada; 5–6,500 feet altitude; June–August. (874.)

PHACELIA PALMERI, Torr. Biennial, 6–15′ high, erect, simple, densely pubescent and glandular; radical and cauline leaves numerous and crowded, 1–2′ long, lanceolate, subpinnatifid or doubly serrate, scarcely petioled; racemes numerous and nearly sessile; calyx-lobes of the subsessile flowers linear-oblong, acutish, half the length of the tubular-campanulate 3″ long corolla; appendages short, above the base of the naked filaments; style hairy at base; capsule globose, 1″ or more in diameter, obtuse, pubes-

cent; seeds 1″ long, pitted.—Collected by Dr. Palmer near St. George on the Rio Virgen in Southern Utah; 1870.

PHACELIA MENZIESII, Torr. (*Eutoca*, R. Brown. *DC. Prodr.* 9. 294.) Annual, erect, 6–12′ high, simple or much branched, hispid; leaves sessile, 1–2′ long, oblong or linear, entire or 3-cleft or rarely pinnatifid, the divaricate lobes oblong or linear, entire; flowers short-pedicelled; calyx-lobes linear, acutish, hispid-ciliate, about equaling the corolla; corolla blue or white, spreading-campanulate, 4–5″ deep, appendages distinct from the filaments, very narrow and thin; stamens included; style bifurcate a third of its length, a little hairy; ovary 16–many-ovuled; capsule ovate, acuminate, 2″ long; seeds nearly black, pitted, ½″ long.—From Oregon and Washington Territory to Nevada (Stretch) and Utah, (505 Frémont, Stansbury.) *Eutoca heterophylla*, Torr., in Stansbury's Report, is the same. West Humboldt Mountains, Nevada, and on Antelope Island and in the Wahsatch, Utah; 4,500–6,000 feet altitude; May, June. (875.)

PHACELIA SERICEA, Gray. (*Eutoca*, Graham. *DC. Prodr.* 9. 294.) Perennial, canescent with a somewhat silky pubescence, appressed upon the leaves; stems erect, ½–2° high, rather stout, simple, terminating above in a narrow compound raceme; leaves mostly oblong, 2–3′ long, incised-pinnatifid, the segments coarsely cut or entire, the petioles narrow and hispid-ciliate; racemes mostly short-peduncled, ½–1′ long in fruit, forming a compound raceme 3–12′ in length; calyx-lobes linear, exceeding the pedicels, shorter than the corolla, which is 2½″ deep, campanulate, blue or rarely white, persistent, the appendages conspicuous, nearly as long as the tube and distinct from the filaments; stamens three times longer than the corolla, the anthers small and roundish; style united to above the middle; capsule pubescent, ovate-oblong, acute, 3″ long, about 16-seeded; seeds ½″ long, pitted.—From the Rocky Mountains of British America (Bourgeau, Drummond) to Colorado and Southern Idaho, (Burke.) Frequent in the cañons of the Battle and East Humboldt Mountains, Nevada, and also found on a ridge of the Uintas above the Duchesne River; 6–9,500 feet altitude; July, August. (876.)

PHACELIA (EUTOCA) CURVIPES, Torr. Annual, dwarf, 2–3′ high, soft-pubescent and somewhat pilose, branching from the base, the stems spreading; leaves lanceolate-oblong, long-petioled, entire, ½–2′ long including the petiole which is often more or less abruptly curved; flowers pedicelled, in

a simple raceme, the lower distant; calyx-lobes narrow-ligulate or spatulate, nearly equaling or shorter than the corolla, becoming 3″ long; corolla deep-blue, rotate-campanulate, 2–3″ long, the appendages narrow, distinct from the filament or united to it only at the base; stamens included; style parted below the middle; capsule ovate, acuminate, 2″ long, subpubescent, erect upon the deflexed pedicel; seeds about 16, irregularly pitted.—Foot-hills near Carson and Washoe Cities and on the Trinity Mountains, Western Nevada; 4,500–7,000 feet altitude; May. (877.)

Phacelia (Eutoca) pusilla, Torr. Annual, dwarf, 1–3′ high, simple or branching from the base, slender, glandular-pubescent; leaves entire, the radical and lower cauline broadly oval or oblong, 2–6″ long, abruptly contracted to a petiole as long as the blade, the upper ones elliptical; racemes simple, loosely few-flowered, terminal; pedicels filiform, spreading, about equaling or shorter than the calyx; sepals narrowly ligulate, 1″ becoming 3″ long; corolla 1½–2″ long, white, tubular-funnelform, with a narrow appendage on each side of the filament but free from it; stamens a little unequal, included; style shorter than the ovary and shortly cleft; capsule obovate, obtuse or acutish, about 2″ long; seeds 18–24, irregularly pitted.—Under sage-brush and junipers, near Carson City and in the East Humboldt Mountains, Nevada; 4,500–6,500 feet altitude; May–July. (878.)

Phacelia (Eutoca) rotundifolia, Torr. Annual, 2–4′ high, diffusely branched, branches ascending, hispid or rough-puberulent; leaves rounded, ½′ or less in diameter, crenate or nearly entire, petioled; racemes simple, short and few-flowered; calyx-lobes linear-spatulate, shorter than the 1½″ long white campanulate corolla; appendages narrow, free from the filament except at the very base; stamens included, the unequal filaments adnate to the corolla at base; capsule obtuse; seeds 100 or more, round-ovoid, irregularly pitted.—Southern Utah, (Dr. Palmer, 1870.)

Phacelia (Euglypta) Fremontii, Torr. *Ives' Colorado Exp., Bot. Rep.* 21. Annual, erect or diffuse, 1° high or less, viscid-pubescent; leaves 1–2′ long, oblong-linear, petioled, pinnatifid, segments 3–8 on each side, obovate, obtuse, entire or sparingly toothed; racemes simple, 8–many-flowered; pedicels very short, erect; sepals spatulate upon a narrow base, 1–4″ long; corolla funnelform, 2–5″ long, purple above and yellow at base, the appendages united over the lower third of the somewhat dilated filament; stamens included, unequal; style hairy, bifid at the apex; capsule oblong, obtuse,

2–2½″ long, 16–30-seeded; seeds transversely rugose, pitted.—Southern California, (Frémont, 350 Torrey;) Western Arizona, (Ives, Cooper.)—Collected in Southern Utah by Dr. Palmer, 1870.

This species and the following, *P. Ivesiana*, have been referred by Dr. Torrey in Ives' Report, as also some of the present new species in the notes accompanying his determinations, to the section *Conanthus*, which was founded by De Candolle for the anomalous species *Eutoca ? aretioides.* But that species, as will be seen, has as little affinity to these as to others of the recognized *Eutoca* section and must still stand alone. There are characters, however, belonging to this and the following species which will justify their ranking as a section (*Euglypta*) distinct from *Eutoca*, viz: the united appendages and the transversely rugose seeds. The appendages are always present, not free and distinct, but united to some extent over the lower part of the filament and usually more or less adnate to it; this, however, is occasionally the case in the section *Phacelia.* The transverse pitted ridges of the seeds are strictly characteristic, but occur again in the genus *Emmenanthe.* The filaments are also unequal and somewhat dilated downward, and the capsule is mostly oblong and obtuse.

PHACELIA (EUGLYPTA) IVESIANA, Torr *Ives' Col. Exped., Bot. Rep.* 21. Annual, 1–10′ high, branched diffusely from the base, the branches ascending, pubescent and more or less glandular; leaves oblong or linear-oblong, ½–2′ long including the petiole, pinnatifid, the segments 3–7 pairs, oblong or obovate, entire or sparingly toothed or sometimes again pinnatifid, obtuse; racemes simple, 10–20-flowered, the flowers suberect on very short pedicels; sepals spatulate with a long narrow base, becoming 3–6″ long; corolla about 2″ long, white or pale-purple, tubular-campanulate, the tube 3 times longer than the rounded lobes, appendages attached to the dilated and slightly adnate base of the filament; stamens included, unequal; style often not exceeding the ovary, bifurcate at the summit; capsule oblong, 2–2½″ long, acutish, obtuse, or emarginate; seeds 16–24, strongly ridged transversely, ½″ long or less.—Very near the last, from which it is hardly distinguished but by the smaller and lighter-colored corolla. Western Arizona, (Ives;) Southern Utah, (Palmer, 1870.) Dry foot-hills in Monitor, Diamond, and Holmes' Creek Valleys, in the shade of *Juniperus* on the Coyote and East Humboldt Mountains, Nevada, and on the shore of Stansbury Island, Utah; 4,300–6,500 feet altitude; June–September. (879.)

PHACELIA (EUGLYPTA) BICOLOR, Torr. Annual, 3–4′ high, viscid-pubescent, branched from the base, branches ascending; leaves 1–2′ long, narrow-oblong, bipinnatifid, the segments unequal, small, obtuse; racemes simple, 10–20-flowered; pedicels short, erect, the lower ones distant; sepals 2–4″ long, narrowly ligulate; corolla broad-funnelform, 5–6″ long, the lobes short and rounded, purple, the tube yellowish; stamens included, unequal, shorter than the tube, the lower third of the filaments inclosed in the united appendages; style short, bifurcate at the summit; capsule 2″ long, oblong, obtuse; seeds 16, transversely rugose, pitted.—Western Nevada, near Carson City, (Stretch, 345 Torrey, 162 Anderson.) Foot-hills of the Trinity Mountains; 4,500 feet altitude; May. (880.)

PHACELIA (EUGLYPTA) GYMNOCLADA, Torr. Annual, low, clothed with a soft spreading subglandular pubescence, diffusely branching from the base; branches procumbent or ascending, simple or branched, 3–6′ long, naked and becoming elongated; leaves obovate-oblong, ½–1′ long, dentate-serrate, obtuse, abruptly narrowed into a petiole often longer than the blade; raceme simple, long-peduncled or nearly sessile; flowers short-pedicelled, the lower ones distant; calyx-lobes linear, hispid, 2–4″ long; corolla bright-blue or sometimes white, campanulate, 4″ long including the spreading limb, the lobes broader than long, the appendages covering the filaments more than half their length; stamens unequal, included; style equaling the corolla-tube, shortly bifurcate; capsule globose-ovate, obtuse, very thin, 1″ or more in diameter, 8–16-seeded; seeds ½″ long, strongly ridged and pitted.—Sandy foot-hills of the Truckee, Trinity, and West Humboldt Mountains, Nevada; 4,500 feet altitude; May, June. (881.)

PHACELIA (EUGLYPTA) CRASSIFOLIA, Torr. Annual, 3–4′ high, diffusely branched from the base, viscidly pubescent; leaves oblong-ovate, somewhat fleshy, scabrous, 3–6″ long, tapering into a short petiole, the lower ones with a few short obtuse teeth, the cauline entire; racemes simple, rather few-flowered; pedicels very short, spreading; calyx-lobes narrowly ligulate, 1″ becoming 2″ long; corolla 3″ long, campanulate-funnelform, the limb light-purple with rounded lobes, the tube yellowish; stamens unequal, less than half as long as the corolla, the appendages obscure and attached to the dilated and shortly adnate base of the filaments; style a little exceeding the ovary, cleft at the summit; capsule ovate-oblong, 1½″ long, obtuse, 6–8-

seeded; seeds ½″ long, rugose, pitted.—Lower valley of the Reese River, Nevada; 5,000 feet altitude; July. (882.)

CONANTHUS[1] ARETIOIDES. (*Eutoca?*, Hook. & Arn. *DC. Prodr.* 9. 295. *Phacelia*, Torr. in Mss.) Dwarf, 1–3′ high, pilose-hispid, diffusely branched from the base and the branchlets short and clustered above; leaves ½–1′ long with the slender petiole, oblanceolate or narrow-spatulate, obtuse or acute; calyx-lobes narrowly linear, 3″ long; corolla 5–8″ long, the tube narrow and the limb broadly dilated, 4–6″ in diameter, the lobes rounded; style about equaling the stamens; capsule 1″ or more in length; seeds ¼″ long.—Commencing to flower when less than half an inch in height and finally becoming a close tuft, profusely flowering. The peculiar habit and mode of inflorescence of this plant, the unequal insertion of the stamens high up in the narrow naked tube of the corolla, and the smooth waxy seeds, plainly separate it from every section of *Phacelia*, and seem to make good its so long suspected right to generic rank. From Eastern Oregon, (Tolmie;) Nevada County, California, (Mrs. A. J. Davis;) Carson Valley, Nevada, (Stretch, 164 Anderson, 341 Torrey.) Found in the Carson and Washoe Valleys and on the foot-hills of the Trinity and Pah-Ute ranges, Western Nevada; 4–5,000 feet altitude; May, June. (883.)

EMMENANTHE[2] PENDULIFLORA, Benth. *DC. Prodr.* 9. 301. Erect, branching from the base, 4–12′ high, glandular-pubescent; leaves 1–2′ long or less, lanceolate, pinnatifid, the segments entire or sometimes 1–3-lobed; pedicels slender, about equaling the pendulous flowers; corolla campanulate, 3–6″ long, a little exceeding the broad calyx, yellowish, the base within dotted with purple.—California, from the Sacramento southward, by numerous collectors, and near Empire City, Nevada, (Dr. Torrey;) Southern Utah, (Dr. Palmer.)

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[1] CONANTHUS. (*Eutoca* § *Conanthus*, DC.) Calyx 5-parted, sinuses naked, lobes not enlarging in fruit. Corolla tubular-funnelform, with a broad 5-lobed limb, appendages none. Stamens included, unequal and unequally inserted in the middle of the tube. Nectary or disk none. Ovary 2-celled, rather many-ovuled. Style bifurcate at the summit. Capsule rounded-ovate, 12–20-seeded. Seeds ovate or oblong, smooth, yellowish.—A low diffusely branched annual, with alternate entire leaves and axillary sessile purple or whitish flowers.

[2] EMMENANTHE, BENTH. (Including *Miltitzia*, DC.) Calyx 5-parted, sinuses naked. Corolla yellow, campanulate, 5-cleft, without appendages, persistent. Stamens included, inserted at the very base of the corolla, with slender filaments and elliptic anthers. Nectary or disk annular, surrounding the base of the ovary, rather thick, free or adnate to the corolla. Ovary ovoid or oblong, compressed, 2-celled by the union of the placentæ in the axis, many-ovuled. Style bifurcate at the summit, subpersistent; stigmas capitellate. Capsule ovoid or oblong, incompletely 2-celled. Seeds 2–20, reticulated, or pitted and transversely ridged, pendent.—Low annual herbs, with alternate pinnatifid or entire leaves; flowers in simple circinate racemes.

Emmenanthe parviflora, Gray. *Pac. R. R. Surv.*, (*Williamson's Rep.*,) 6. 84, *t.* 15. Dwarf, much branched, depressed, minutely hairy and glandular; leaves petioled, subpinnately-parted, the 5–9 lobes entire, oblong or obovate, 1–2″ long; flowers crowded, very shortly pedicelled; sepals linear, obtuse, from 1½″ becoming 3″ long; corolla yellow, rather narrow-campanulate, nearly 2″ long, persistent at the base of the capsule, the lobes short-ovate, the narrow 5-lobed disk adnate to its base; ovary ovoid, densely hairy, 2-celled, very many-ovuled; style not exceeding the ovary, subpersistent; capsule 3″ long, acutish, 20–40-seeded; seeds oblong, finely reticulated.—Shore of Klamath Lake, Oregon, (Newberry;) Santa Barbara, California, (350 Torrey;) near Carson City, Nevada, (81 Anderson.) The present specimens have much larger leaves, 1–2′ long; stamens unequal; ovary 12-ovuled; style exceeding the ovary, divaricately bifurcate at the summit; habit and foliage almost precisely that of *Phacelia gymnoclada*. Foot-hills near Truckee Pass, Nevada; May. (884.)

Emmenanthe glandulifera, Torr. About 3′ high, very slender, diffusely branching from the base, glandular-pubescent; leaves 3–6″ long, oblong, cuneate at the base, the radical and lower sparingly and obtusely toothed, the cauline entire; sepals 1–1½″ long, ligulate; corolla yellow, 2″ long, tubular-campanulate; disk very obscure; stamens equal, as long as the tube; style equaling the oblong obtuse ovary, the divisions recurved; ovules 6–12; capsule oviform, 1″ long, 2–3-seeded; seeds ¾″ long, transversely rugose-pitted.—Virginia Mountains, Nevada, above Valley Wells; 5,000 feet altitude; July. (885.)

Emmenanthe glaberrima, Torr. Decumbent, diffusely branched from the base, glabrous throughout, stems becoming 10′ long; leaves ½–1′ long, obovate or oblong-spatulate, attenuate into a rather short petiole, entire or coarsely 2–4-toothed, rather thick and fleshy, the upper ones approximate in pairs and nearly opposite; racemes lateral and terminal, often cymosely branching, few–many-flowered; pedicels erect, shorter than the narrow-oblong obtuse sepals; corolla bright-yellow, campanulate, 1–1½″ long, but little exceeding the calyx, cleft below the middle, the lobes obovate and obtuse; disk prominent; stamens equal; style equaling the ovary, united to above the middle, the branches erect or recurved; ovary glabrous, 8–10-ovuled; capsule oblong, abruptly acuminate with the base of the persistent style, 2″

long; seeds 6–8, over ½″ long, transversely rugose and pitted.—In the lower Humboldt and Reese River Valleys, Nevada; 4–5,000 feet altitude; May–July. It is also the *Eutoca aretioides* of Ives' Report, collected on the Flax River in Northern Arizona. Apparently resembling *Miltitzia lutea*, DC., found by Tolmie in Eastern Oregon or Southern Idaho, which differs, according to the description, in being scabrous-pubescent, the linear sepals 3″ long, the corolla-tube pilose externally, the disk none, (or more probably narrow,) and the ovary also pilose. (886.)

Tricardia[1] Watsoni, Torr. Stems several from a perennial caudex, 6–8′ high, simple, pilose with white webby hairs; leaves lanceolate, acutish, pubescent, the radical ones 1–2′ long, attenuate into a long petiole, the cauline ½–1′ in length, sessile or short-petioled; racemes axillary and terminal, 6–10-flowered; pedicels slender, mostly nodding; calyx glabrous, from 2″ becoming 1′ long, the outer three sepals deeply cordate, subchartaceous, very strongly veined, the inner linear ones a little shorter; corolla purplish, 3″ deep, the lobes rounded, spreading; style twice longer than the ovary; capsule 3″ long; seeds 1″ in length, slightly roughened.—A plant of solitary habit and rare. The mature capsule in every case examined was compressed parallel with the placentæ, which in some cases remained united a considerable part of their length. The young ovary rather indicates compression in the other direction. Found on foot-hills of Truckee Pass and the Trinity Mountains, Western Nevada; 4–4,500 feet altitude; May. Plate XXIV. Fig. 1. A plant of the natural size, but incorrectly showing the fruiting pedicels erect instead of nodding. Fig. 2. A flower; magnified four diameters. Fig. 3. The same, laid open. Fig. 4. A fruiting calyx, natural size, with two of the outer sepals displaced. Fig. 5. A half-capsule, after dehiscence; enlarged two diameters. Fig. 6. A transverse section; enlarged four diameters. Figs. 7 and 8. A seed, with the albumen and embryo; enlarged eight diameters. Fig. 9. A portion of the corolla, showing the insertion of the stamens and position of the appendages. (887.)

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[1] TRICARDIA, Torr. Calyx 5-parted, becoming enlarged and conspicuous in fruit, three of the sepals exterior, bractlike, broad-cordate and strongly reticulate-veined, the two others linear. Corolla broad-campanulate, slightly constricted at the throat, 5-cleft, appendaged near the base with ten distinct narrow folds, deciduous. Disk none. Stamens included, inserted very near the base of the corolla, the filaments rather slender and anthers elliptical. Ovary ovate, glabrous, 2-celled; ovules 8, pendulous. Styles united to the middle; stigmas capitellate. Capsule ovate, acuminate with the persistent base of the style, compressed, loculicidal, imperfectly 2-celled, the placentæ separating in the axis and but slightly thickened on the edges. Seeds about 8, oblong, compressed, pendent; embryo shorter than the copious horny albumen.—A low perennial herb, with entire alternate leaves and loose few-flowered bractless subcicrinate racemes.

PLATE XXV

[illegible]

NAMA[1] DEMISSA, Gray. *Proc. Amer. Acad.* 8. 283. Annual, hirsute, branches spreading from the slender root, decumbent, 2–6′ long; leaves spatulate-linear, ½–1′ long, attenuate to a narrow base; flowers subsessile, the lower solitary in the forks, the upper axillary; sepals narrow-linear, 2 3″ long; corolla 3″ long, light-purple; capsule short-oblong, 1½″ long or less; seeds 10–12 in each cell, nearly ⅓″ in length, oval, obscurely rugose-pitted.—Washington Territory, (Lyall;) Western Nevada, (Frémont, Anderson, Torrey.) Found on the shore of Stansbury Island in Salt Lake; June. Distinguished from *N. hispida* by the shorter fewer-seeded capsule and nearly twice longer seeds. The flowers on the present specimens are also always solitary. (888.)

## POLEMONIACEÆ.[2]

PHLOX CANESCENS, T. & G. *Gray's Revis. Polemon., Proc. Amer. Acad.* 8. 253. Dwarf and matted cæspitose, with a woody perennial much-branched base which is usually covered with the dead leaves of previous seasons, the branchlets densely leafy up to the solitary sessile flowers, woolly-canescent; leaves 3–4″ long, evergreen, rigid, subulate and more or less acerose, scarious-connate at base, usually strongly revolute upon the margin, soon spreading or somewhat squarrose-recurved from the appressed base; tube of the white corolla more or less (usually a half) exceeding the calyx, the obovate lobes entire or emarginate, 3–4″ long; ovules solitary.—From the Rocky Mountains of Colorado to New Mexico and west to the Sierras. On the Trinity and West Humboldt Mountains and on a ridge in Monitor Valley, Nevada; 5–7,000 feet altitude; May–July, and in bloom in November. Also found in the Cedar Mountains, west of Salt Lake, by Stansbury, and in the Wahsatch by Mrs. Carrington. (889.)

PHLOX CÆSPITOSA, Nutt. *Gray, l. c., p.* 253. Of like habit with the last; densely or rather loosely cæspitose, the more rigid leaves linear-subulate or oblong-linear, 4–6″ long, crowded and often densely so, hispid- or roughish-

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[1] NAMA, L. Calyx 5-sepaled, persistent. Corolla tubular-funnelform. Stamens subincluded. Style 2, with rather obtuse stigmas. Capsule 2-celled, loculicidal, the septum bearing two laminar placentæ projecting into each cell from the axis, which are at first united, at length free.—Low annual branching herbs, or perennial or somewhat woody at base, variously pubescent, with alternate or rarely opposite entire leaves, and axillary and terminal flowers. CHOISY, *DC. Prodr.* 10. 812.

[2] The determinations under this order were made by Dr. ASA GRAY, and the descriptions are almost wholly drawn from his recent "Revision of the North American Polemoniaceæ," and from other notes obligingly furnished by him.

ciliate, otherwise glabrous or sparingly glandular-roughened, mostly revolute on the margin; tube of the white corolla a little exceeding the calyx, the lobes obovate, entire, 3″ long; ovules solitary.—From Colorado to Montana, Oregon and the Sierras. Clover Mountains, Nevada; 10,000 feet altitude; September. (890.)

Var. RIGIDA, Gray. Depressed; the accrose-subulate leaves at length recurved-spreading, sparingly glandular-roughened.—Oregon, (Douglas.) Found on the highest peak of the Clover Mountains, Nevada; 11,000 feet altitude; September. (891.) A more pubescent form, coming near to *P. Douglasii*, was also collected on peaks of the East Humboldt Mountains, Nevada; 9,000 feet altitude; July. (892.)

PHLOX DOUGLASII, Hook. *Gray, l. c., p.* 254. Resembling the last; cæspitose and very much branched, pubescent or nearly glabrous; leaves rather rigid, accrose, usually spreading, less dense, the margins either naked or hirsutish-ciliate at the base; flowers subsessile; corolla purple or white, the tube more or less exceeding the calyx, the lobes obovate, entire, 3″ long; ovules solitary.—From the Rocky Mountains of Colorado and Montana to the Sierras and Washington Territory. In cañons near Carson City, Nevada; April, at 5,000 feet altitude, with the ciliation on the calyx and at the base of the leaves more than usually webby; also at the head of Provo Cañon in the Uintas, at 9,000 feet altitude; July. (893.)

Var. LONGIFOLIA, Gray. Branches usually erect from a prostrate rhizoma; leaves very narrowly or accrose-linear, 5–8″ long, less fascicled.—Approaching *P. longifolia*, and occurring "east of the Rocky Mountains and in Utah." Not in the collection.

PHLOX LONGIFOLIA, Nutt. *Gray, l. c., p.* 255. Perennial, woody only at base, glabrous or pubescent; stems erect or ascending, 2–12′ high; leaves slightly rigid, not fascicled, spreading, very narrowly or narrowly linear or sometimes lanceolate, 1–3′ long; flowers solitary or subcymose, long-peduncled; calyx-tube usually angled to the base by the infolding of the scarious intercostal membranes; corolla white or pink, the tube exceeding the narrow-subulate calyx-teeth, the lobes obovate- or oblong-cuneate, entire or retuse; style elongated and frequently equaling the tube; ovules almost always solitary.—From the Rocky Mountains of Colorado to Washington Territory and the Sierras. A smooth form was collected in the East Humboldt Mountains; 8–9,000 feet altitude; July. (894.)

Var. Stansburyi, Gray. Stouter; the pubescence of the branches and calyx more or less glandular or viscid; leaves usually broader; corolla-tube usually twice longer than the calyx, the lobes either emarginate or erose at the apex; one or two of the cells of the ovary sometimes 2-ovuled—In the southern districts, extending into New Mexico and Arizona. Very common on the mountains and foot-hills through Nevada and Utah; 4,300–9,000 feet altitude; May–July. (895.)

Subvar. brevifolia, Gray. Usually dwarf; leaves either narrowly or oblong-lanceolate, about ½′ long.—Very frequent on the mountains and foot-hills through Nevada; 4,500–8,000 feet altitude; April–July. (896.)

Collomia[1] grandiflora, Dougl. *Gray.*, *l. c.*, *p.* 259. Annual, erect, 1–2° high, more or less viscid-pubescent or glandular; leaves sessile, linear or oblong-lanceolate, entire or sometimes sparingly incised; flowers capitate-crowded and leafy-bracted, or a few subsolitary in the forks; calyx obconical, the lobes broad and obtuse; corolla buff or light salmon-color, (rarely white,) narrow-funnelform, 1′ long; ovules solitary; seeds with very numerous spiricles.—West of the Rocky Mountains, from latitude 48° to Nevada and Southern California. Frequent on the foot-hills and mountains through Nevada and Utah; 4,500–6,000 feet altitude; June, July. (897.)

Collomia linearis, Nutt. *Gray*, *l. c.*, *p.* 259. More branching or spreading with age, 6–18′ high; calyx-lobes triangular-lanceolate, acute; corolla light-blue or nearly white, ½′ long, slender, but little enlarged at the throat, the limb small; otherwise as in the last.—From the Mackenzie to Kansas, Nevada and the Pacific. With the last, frequent; May–July. (898.)

Var. subulata, Gray. A span high, loosely much branched; leaves linear-lanceolate or linear, narrowed at each end, acute; lower clusters of flowers rather loose and few- (sometimes single-) flowered; calyx-lobes slender-subulate or almost awn-pointed from a broad base, rather longer than the tube.—Middle California to Southern Oregon and Western Nevada, (Stretch.) A low diffusely branched and loosely flowered form, near this variety, was collected in the East Humboldt Mountains; 7,000 feet altitude; July, August. (899.)

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[1] COLLOMIA, Nutt. Corolla tubular-funnelform or salverform with a more or less dilated throat. Filaments slender, unequally inserted, usually protruded. Ovules solitary, few or many in each cell. Seed-coat developing mucilage and projecting numerous spiral threads (spiricles) when wetted, (except in *C. gracilis.*)—Annuals or some biennials, with alternate leaves, (or only the lower ones opposite,) which are usually pinnately incised or divided, and with clustered or sometimes scattered flowers.

COLLOMIA TENELLA, Gray; *l. c., p.* 259. Annual, slender, 3 4′ high, viscous-puberulent; leaves linear with a long tapering base, entire, obtusish, the lowest opposite; flowers solitary in all the forks almost from the base, remote, nearly sessile; calyx broadly obconic, barely 2″ long, the lobes triangular, acute, shorter than the broadly turbinate tube; corolla purplish, at length 4″ long, narrow, almost salverform; ovules solitary; seeds with numerous spiricles.—In the East Humboldt Mountains, Nevada, and in the Wahsatch; 7,000 feet altitude; June, July. (900.)

COLLOMIA GRACILIS, Dougl. *Gray, l. c., p.* 259. Annual, viscid-pubescent, at length corymbosely much branched and spreading, 2–6′ high; leaves sessile, lanceolate or linear or the lowest oval or obovate, entire, the lower often opposite; flowers rather loosely cymose or scattered; calyx rounded at base, nearly 5-parted, with subulate-linear segments; corolla 5″ long, purple or violet, nearly salverform, the narrow tube yellowish and seldom exceeding the calyx; ovules solitary; seeds without spiricles.—Very variable. From Colorado, Arizona, and Southern California to Washington Territory Frequent on the mountains and foot-hills through Nevada and Utah; 4,500–6,000 feet altitude; April–June. (901.)

COLLOMIA LEPTALEA, Gray; *l. c., p.* 261. Annual, glabrous or minutely glandular; stem slender, 3–10′ high, branching into an effuse panicle; pedicels scattered and 1-flowered, almost capillary, (3–12″ long,) naked; leaves all entire, scattered, narrow-linear; corolla white or pale purple, about ½′ long, its slender tube usually twice the length of the calyx, expanding above into an ample funnelform throat longer than the ovate lobes; filaments very unequally inserted in the throat; anthers very short; cells about 6-ovuled.—Slopes of the California Sierras; also found in the Truckee Valley, Nevada, near Glendale, by W. W. Bailey. PLATE. XXV. Fig. 1. A plant, of the natural size. Fig. 2. A flower; enlarged three diameters. (902.)

GILIA[1] LINIFLORA, Benth. *Gray, l. c., p.* 263. Annual, erect or at length diffuse, 6–18′ high, minutely hispidulous-hirsute or usually nearly glabrous, loosely panicled above; leaves opposite, frequently alternate above, palmately 3–7-parted, the segments ½–1′ long, nearly filiform, entire; flowers

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[1] GILIA, RUIZ & PAV. Corolla from salverform or funnelform to campanulate or rotate. Stamens equally inserted in or below the throat or sinuses of the corolla and mostly equal; filaments not declined, naked (rarely pubescent) at the base. Ovules sometimes solitary, commonly few or many in each cell. Seed-coat (with few exceptions) developing mucilage or spiricles when wetted.—Herbs, or in a few cases suffruticose; leaves, &c., various.

…LEMIA LEPTALEA … GILIA … … NUTTALLII

scattered, on capillary pedicels 5–15″ long; corolla white, 2–3 times exceeding the calyx, rotate when fully expanded, 5-parted nearly to the very short tube, the lobes obovate, entire, 4–6″ long; filaments inserted at the top of the tube, pubescent at base; anthers oval; ovules 6–8 in each cell.—California. Var. PHARNACEOIDES, Gray. Smaller, with the corolla-lobes 2–3½″ long, sometimes slightly flesh-colored.—To Fraser's River and east to the Rocky Mountains. Pah-Ute Mountains, Nevada, and in the Wahsatch and Uintas; 5–7,000 feet altitude; June, July. (903.)

GILIA PUSILLA, Benth. *Gray, l. c., p.* 263. Annual; stems very slender, diffuse, 2–6′ high, minutely hispid-scabrous or nearly glabrous; leaves opposite or the uppermost alternate, palmately 3–7-parted, the segments filiform-subulate, 3–5″ long; flowers scattered, on capillary pedicels 5–10″ long; corolla purplish with a yellow throat or nearly white, short and open funnelform, the broadly obovate entire lobes equaling or exceeding the subcampanulate throat and very short tube; filaments inserted below the sinuses, nearly glabrous at base; anthers oval; ovules 3–5 in each cell. Var. CALIFORNICA, Gray. Corolla-lobes larger, 2–3″ long, twice longer than the calyx, the throat sometimes brownish.—Foot-hills of the Sierras. Specimens approaching the typical Chilian form were collected in the Toyabe Mountains, Nevada, and in the Wahsatch; 6,000 feet altitude; June, July. (904.)

GILIA BIGELOVII, Gray; *l. c., p.* 265. Annual, erect and usually slender, 4–12′ high, glabrous; leaves opposite, palmately 3–5-divided or sometimes all entire, filiform or nearly so; flowers inconspicuous, terminal or in the forks, subsessile; calyx cylindric, white-scarious excepting the ribs, which are prolonged into acerose-linear curved teeth; corolla whitish, salverform, hardly exceeding the calyx, the broadly cuneate-obovate lobes not over 2″ long and but half or a third as long as the tube, minutely crenulate or erose, strongly convolute in æstivation; stamens included in the tube, the filaments slender, inserted below or above its middle; anthers oval; cells 20–40 ovuled; capsule cylindric or oblong; seeds oval or oblong, the close coat copiously mucilaginous.—Western Texas to Arizona and Nevada. Foot-hills of the Truckee and Trinity Mountains, Western Nevada; 5,000 feet altitude; May. PLATE. XXV. Fig. 3. A plant; natural size. Fig. 4. A flower, with the calyx laid open. Fig. 5. The corolla, laid open. Fig. 6. The ovary. Fig. 7. The mature capsule; all twice enlarged. (905.)

GILIA ANDROSACEA, Steud. *Gray, l. c., p.* 265. Annual; stems erect

or spreading, 3–12′ high, minutely pubescent or scabrous; leaves opposite and fascicled, palmately 5–7-parted, the segments linear-filiform, villous- or subaculeate-ciliate; flowers crowded with the bracts into capitate clusters; corolla salverform, the filiform tube 1′ or less long, thrice the length of the oval or ovate entire lobes and much exserted beyond the hirsute- or villous-ciliate bracts and subtending leaves, the limb 8–10″ in diameter, lilac, pink or nearly white, with a yellow or dark very short and abruptly dilated throat; filaments slender, inserted in the throat, more or less exserted but shorter than the corolla-lobes; anthers short; cells 6–10-ovuled.—California. Var. DETONSA, Gray. Nearly glabrous, the bracts and leaves merely hispidulous-ciliate. A somewhat intermediate form was collected near Carson City by Dr. Anderson.

GILIA MICRANTHA, Steud. *Gray, l. c., p.* 266. Resembling the last, slender, 3–7′ high; corolla-tube extremely slender, ¾–1½′ long, 4–6 times exceeding its (2–3″) lobes; bracts with short and soft pubescence or sometimes hirsute-ciliate; corolla yellow, cream-color or purplish-white.—California and Nevada.

GILIA CILIATA, Benth. *Gray, l. c., p.* 266. Resembling the preceding, rigid, rough, 3–12′ high, the taller stems virgate; corolla-tube 6–7″ long, scarcely exceeding the very hirsute or hispid-ciliate bracts and leaves; the lobes 1½″ long; calyx-lobes acerose.—Rose-color fading to white; stems grayish with short pubescence; leaves and bracts fringed with both rigid and soft spreading hairs. California and Nevada.

GILIA NUDICAULIS, Gray; *l. c., p.* 266. Annual, very glabrous, 1–4′ high, at length branching from the base; stem leafless from the cotyledons to the capitate inflorescence, which is subtended by an involucre of several ovate-lanceolate or lanceolate sessile entire foliaceous bracts; corolla white, pink or yellow, salverform, the tube 3–4″ long and thrice the length of the calyx, the cuneate lobes 2–3″ long, somewhat undulate-toothed or decidedly 1–3-dentate at the broad apex; anthers sessile in the somewhat dilated throat, short, included; ovules numerous.—Interior of Oregon, Nevada, (Anderson, Stretch,) and South Park, Colorado, (Hall.) Found under sage-brush near Empire City, Nevada; April. (906.)

GILIA NUTTALLII, Gray; *l. c., p.* 267. Puberulent; stems numerous from a perennial woody base, slender, simple or loosely branched; leaves opposite, mostly shorter than the internodes, palmately parted into 3–7 narrow-linear

mucronate or acerose divisions, 6–9″ long; flowers crowded into a leafy cluster; corolla white with a yellow throat, fragrant, salverform with a very short dilated funnelform throat, the tube puberulent, not exceeding the narrow calyx, rather longer than the oblong-obovate (2–3″) lobes; filaments short, inserted in the throat, slightly exserted; anthers ovate-oblong; cells 2-ovuled.—From Colorado and Utah to the Sierras; near Carson City, Nevada, (Anderson.) On rocky ridges in the East Humboldt Mountains, and Wahsatch; 8,500–9,000 feet altitude; July, August. PLATE XXVI. Fig. 8. A branch; natural size. Fig. 9. Calyx; and Fig. 10. Corolla; enlarged two diameters. (907.)

GILIA WATSONI, Gray; *l. c., p.* 267. Roughish-puberulent and glandular or at length smoothish; stems short (3–5′) and tufted, slender and almost herbaceous, from a woody perennial base; leaves all opposite, not much fascicled, widely spreading, palmately 3–5-parted, the slender entire acerose segments (6–8″ long) often shorter than the internodes; calyx-lobes acerose, barely half the length of the tube; flowers solitary or few in a cluster at the extremities of the branchlets; corolla dull pinkish-white with purplish throat, salverform, the tube and lobes each ½′ long; filaments short, inserted on or below the somewhat funnelform throat; anthers at the orifice, short; cells 10-ovuled; the close seed-coat not developing spiricles nor mucilage when wetted.—On rocky ridges upon Stansbury Island, Salt Lake, and in the Wahsatch and Uintas; 5,500–8,000 feet altitude; June–August. PLATE XXVI. Fig. 1. A stem with a portion of the base; natural size. Fig. 2. The calyx; enlarged two diameters. Fig. 3. Corolla; natural size. Fig. 4. Ovary. Fig. 5. Capsule; each enlarged two diameters. (908.)

GILIA PUNGENS, Benth. *Gray, l. c., p.* 268. Perennial, with decidedly woody stems, the branches and mostly erectish or little-spreading leaves viscid-pubescent or glabrate; leaves alternate, somewhat rigid, thickly fascicled in the axils, palmately 3–7-parted, the segments entire and with the calyx-lobes acerose or subulate and pungent; flowers sessile, solitary or few in a terminal cluster; corolla pink, white or yellow, salverform, the tube at length more or less exceeding the calyx, the wedge-obovate lobes 2–4″ long; anthers in the somewhat funnelform throat oblong; cells 8–10-ovuled; seed-coat close, without mucilage or spiricles.—Very variable. From the Upper Platte to the Columbia and south to Arizona and California. Trinity

and East Humboldt Mountains, Nevada; 6–9,000 feet altitude; May–August In rather dense tufts, 6–10′ high. (909.)

Var. SQUARROSA, Gray. Taller, 1–2° high, with stouter squarrose spreading or recurved leaves on virgate erect branches.—From the Columbia to Nevada and Utah. On foot-hills from the Pah-Ute to the Shoshone Mountains, Nevada, and on Carrington Island; 4,200–5,000 feet altitude; June, July. (910.)

GILIA INTERTEXTA, Steud. *Gray, l. c., p.* 269. Annual; stem low, (1–10′,) much branched, pubescent with white hairs; leaves glabrous except at base, alternate, pinnately divided, the acerose-spinescent segments widely divaricate, sparingly again divided or often simple; flowers capitate-crowded and often densely bracted, the base of the leafy bracts and the calyx-tube very villous with long white spreading hairs; corolla white, 4″ long, the slender funnelform tube rather shorter than the rigid and spinulose often divided calyx-lobes, the corolla-lobes oval or oblong; stamens inserted in or below the throat, exsert and at length equaling the lobes; anthers short; ovules and seeds 3–4 in each cell.—From Columbia River to Northern California and eastward in the Rocky Mountains. East Humboldt Mountains, Nevada; 7,000 feet altitude; August. A single specimen. (911.)

GILIA MINIMA, Gray; *l. c., p.* 269. Resembling the last, but stems very low, (½–1′ high,) simple or branched, white-pubescent; leaves less divided; bracts densely crowded, almost hiding the small white flowers, nearly glabrous, the calyx slighty white-hairy only in the sinuses; calyx-teeth unequal, entire, or two of them often somewhat divided; corolla 1½″ long, but little exceeding the calyx-tube; stamens shorter than the corolla-lobes; cells 1–3-ovuled, 1-seeded.—Near Fort Walla-Walla, (Nuttall;) Colorado, (Vasey.) Found in Parley's Park in the Wahsatch; 6,000 feet altitude; June, July. (912.)

GILIA BREWERI, Gray; *l. c., p.* 269. Resembling the preceding; minutely glandular-puberulent throughout without white hairs; stems 1–6′ high, branched; heads less crowded and less densely bracted; corolla yellow, equaling the entire calyx-lobes, 3–4 long; stamens equaling or exceeding the lobes; ovary-cells 1–2-ovuled; capsule exceeding the calyx-tube, cells 1-seeded; seeds ½–1″ long.—Ebbet's and Amidor Passes, California, (2015 and 2109 Brewer.) East and West Humboldt Mountains, and in the Wahsatch with the last; 6–9,000 feet altitude; June, July. (913.)

GILIA SETOSISSIMA, Gray; *l. c., p.* 271. Annual, depressed, 1–4′ high, at length diffusely branched, somewhat pubescent throughout; leaves 6–9″ long, narrowly cuneate, ciliate towards the base with stout geminate bristles, the apex 2–3″ wide, with 3 triangular-ovate teeth tipped with a single bristle; bracts similar; flowers scarcely crowded; calyx-lobes subulate, tipped with a scabrous bristle as long as the lobe; corolla light-blue, narrowly funnelform, 6–9″ long, the tube much exserted, pubescent, the lobes oblong, acutish, 2″ long; stamens unequal, inserted just below the sinuses, exserted; anthers oblong, ¾″ long; capsule 3″ long, oblong, triangular, 6-seeded or more.—Southeastern California, Arizona, Southern Nevada, (Frémont) and Southern Utah, (Palmer, 1870.)

GILIA SCHOTTII. (*Navarretia*, Torr. *G. setosissima*, Var. *exigua*, Gray; *l. c.*) Much resembling the last; leaves linear-oblong, 1–2″ wide, of nearly uniform width to the clasping base, truncately 3-toothed at the scarcely broader apex, obscurely toothed laterally with simple bristles; corolla white, 5″ long, the tube not exserted; anthers much smaller, subrounded, ⅓″ long; capsule 1½″ long, ovate, about 12-seeded, (3–5-ovuled, *Gray.*)—Northern Arizona, (Ives;) Southern Utah, (Palmer, 1870.) The specimens of these two forms collected by Dr. Palmer are so well-marked that both Dr. Torrey's species are retained.

GILIA FLOCCOSA, Gray; *l. c., p.* 272. Annual, rather slender, 4–12′ high, at length diffusely panicled, floccose-woolly, at least when young; leaves alternate, simply pinnately parted or some of them entire, the few segments narrow-subulate; flowers capitate-crowded, the 3–5-cleft bracts and calyx densely clothed with long and tangled white wool, their lobes acerose or subulate and cuspidate; corolla salverform, 4–8″ long, blue or becoming white, the lobes oblong or ovate, nearly 3″ long; anthers exserted, linear-oblong, sagittate, hardly over ½″ long; cells 1–2-(sometimes 3–4-) ovuled.—From Oregon to California, Arizona, Utah, and Colorado. Truckee, Carson, and Ruby Valleys, Nevada; 4,500–6,000 feet altitude; July–September. (914.)

GILIA FILIFOLIA, Nutt. *Gray, l. c., p.* 272. Resembling the last, slender, 3–10′ high; flowers rather smaller, the lobes of the corolla but 1–2″ long, the tube scarcely exserted; anthers oval, ¼–⅓″ long; cells 4–6-ovuled.—Southern California and eastward to Utah, New Mexico and Western Texas. On foot-hills and ridges between the East and West Humboldt Ranges,

Nevada; June, July; 5–6,000 feet altitude. The specimens are referred to Var. DIFFUSA by Dr. Gray, but as "too near small forms of the last." They are apparently only an early undeveloped state of *G. floccosa*. (915.)

GILIA GUNNISONI, T. & G. *Gray, l. c., p.* 273. Annual, a span high, slender, more or less woolly-pubescent when young, at length almost glabrous, loosely paniculate-branched; leaves scattered, entire, linear-filiform; flowers in smaller heads, terminating slender peduncle-like branches; bracts short, lanceolate, entire, short-cuspidate like the triangular calyx-lobes; corolla white or nearly so, salverform, the tube slightly exceeding the calyx and longer than the oval or oblong lobes; stamens shorter than the lobes, inserted in or near the sinuses; anthers ovate; cells 2–3-ovuled.—Sandy banks of Green River, Utah, (Gunnison;) Northern New Mexico, (Newberry.)

GILIA CONGESTA, Hook. *Gray, l. c., p.* 274. Perennial, more or less woolly-pubescent, stems 3–12′ high, erect or spreading from a tufted base, bearing single terminal or few and corymbose close heads; leaves alternate, pinnately parted with 3–7 mucronate linear segments, or some of them entire; corolla white, salverform, the tube 2″ long, about equaling the oval lobes, not exceeding the usually awned calyx segments; filaments inserted in the sinuses, at length equaling the anthers; cells 2–4-ovuled.—From Colorado to Oregon and the Sierras. From Roberts Station to Holmes Creek Valley, on the foot-hills and mountains; 6–10,000 feet altitude; July–September. (916.)

Var. CREBRIFOLIA, Gray. Depressed and cæspitose-crowded; stems many, 2–3′ high, crowded with glabrous or slightly woolly subulate entire or trifid leaves; bracts subulate, short; flower-clusters solitary.—Southwestern Wyoming, (Nuttall.) Foot-hills of Bear River Valley, Utah, near Evanston; 6,000 feet altitude; July. (917.)

GILIA PUMILA, Nutt. *Gray, l. c., p.* 274. Annual; stems loosely woolly, at least when young, leafy, 3–4′ high; leaves alternate, narrow-linear, entire, or pinnately 2–5-parted with diverging linear mucronate lobes; flowers leafy-bracted, cymose-clustered or at length loose; corolla white, salverform, the tube 3–4″ long, about thrice exceeding its lobes and twice longer than the short-awned calyx-lobes; filaments slender, inserted at the sinuses, shorter than the corolla-lobes; cells about 6- (sometime 2–3-) ovuled.—From Western Nebraska and Wyoming to Western Texas and New Mexico. Foot-hills of the Truckee Mountains, Nevada; 4,500 feet altitude; May. (918.)

GILIA POLYCLADON, Torr. *Gray, l. c., p.* 274. Annual; stems puberu-

lent or sparsely pubescent, diffuse and subdecumbent, 4–8′ long; leaves very few, alternate, pinnatifid or incised, with short oblong abruptly spinulose-mucronate lobes, those subtending the cymose cluster longer than the flowers; corolla pinkish-white, 1½–2″ long, salverform, the tube hardly exceeding the mucronate-awned calyx-lobes; anthers in the throat, on very short filaments; cells 2-ovuled.—New Mexico to Utah and Western Nevada. Foot-hills of the Virginia, Trinity, and West Humboldt Mountains, Nevada, and on the sandy shore of Stansbury Island; 4,300–5,000 feet altitude; May, June. (919.)

GILIA AGGREGATA, Spreng. *Gray, l. c., p.* 275. Biennial, more or less pubescent; stems 1–4° high, less leafy above and often loosely branching; leaves alternate, simply pinnately-parted, with narrow-linear mostly bluntish mucronulate segments; panicle mostly with loose and open branches; bracts inconspicuous; calyx commonly glandular, its lobes subulate (or subdeltoid in Var. *Bridgesii*;) corolla scarlet, varying to light-pink, tubular-funnelform, 6–20″ long, with ovate or lanceolate acute widely spreading or soon recurved lobes; stamens inserted in the throat or below the sinuses, exserted or included, not exceeding the corolla; anthers oval or short-oblong; ovules numerous.—Very variable, especially in the calyx. From the Upper Platte and Missouri Rivers to New Mexico and Arizona, and west to the Columbia and California. Found in the mountains and higher valleys from the Sierras to the Wahsatch; 6–8,000 feet altitude; May–September. (920.) A form with the corolla white, finely dotted with scarlet, is not rare. (921.)

GILIA SUBNUDA, Torr. *Gray, l. c., p.* 276. Biennial, glandular-puberulent; stems 6–12′ high, nearly naked above and loosely panicled; leaves 1′ long, crowded at the subwoody base, spatulate or oblong, tapering into a margined petiole, mostly with a few coarse teeth or short lobes, the upper decreasing to linear remote bracts; flowers rather crowded in the few clusters, inconspicuously bracted; calyx-lobes subulate, shorter than the tube; corolla orange or scarlet, narrowly tubular-funnelform, the tube (½′ long) thrice exceeding the ovate obtuse lobes; anthers included in the throat, on very short filaments; ovules numerous.—Arizona or New Mexico, and also collected by Stretch in Western Nevada.

GILIA STENOTHYRSA, Gray; *l. c*, *p.* 276. Biennial, glandular-puberulent, a span or more high; stem stout, simple, very leafy up to the narrow virgate thyrsus; leaves alternate, simply pinnately-cleft with short oblong lobes, the floral ones and bracts small and entire; calyx-lobes triangular; corolla white,

½′ long, salverform, the tube rarely twice longer than the calyx and little exceeding the obovate lobes, which are shorter than the slender moderately exserted filaments; anthers ovate; cells about 6-ovuled; seed-coat without mucilage or spiricles.—Cedar forest on the southern slope of the Uintas, (Frémont.)

GILIA TENERRIMA, Gray; *l. c., p.* 277. Annual, slender, 10′ high, very diffusely branched from the base with numerous scattered divaricate almost filiform branchlets, minutely glandular-pubescent; leaves alternate, linear or the radical ones lanceolate, the upper ones becoming very small, entire; flowers small, solitary, terminal on the branchlets; calyx less than the broad-oval or globose capsule; cells 1-seeded; seed ovoid.—Corolla unknown. Bear River Valley, near Evanston; 6,000 feet altitude; July. (922.)

GILIA INCONSPICUA, Dougl. *Gray, l. c., p.* 278. Annual, mostly low, (4–12′ high,) more or less pubescent or glabrate, branched and loosely panicled; leaves alternate, the lower 1–2-pinnatifid or pinnate-toothed; flowers scattered on slender pedicels, inconspicuously bracted or bractless; corolla purple or blue, rarely white, 3–5″ long, funnelform with the throat more or less dilated, 2–3 times the length of the calyx, the tube little or not at all exserted, the lobes ovate or obovate and mostly exceeding the stamens; filaments slender, inserted in or just below the sinuses; cells many-ovuled.—Very variable. From the Platte to the Columbia, and southward to Arizona and Southern California. Very frequent in the valleys and on the foot-hills from the Sierras to the Wahsatch; 4–6,500 feet altitude; May–July. (923.)

Var. SINUATA, Gray. Corolla larger, the tube more or less exserted, the lobes often 2″ long and the stamens sometimes equaling them; radical leaves often simply pinnatifid.—Near Carson City and in Truckee Pass, Nevada; April, May. (924.) Also, in the latter locality, a form with the stamens exceeding the lobes. (925.)

Specimens were also collected in Washoe Valley and in the Trinity Mountains, Nevada, with the calyx and upper leaves glandular-viscid, thus approaching Var. ARENARIA of the California coast, but with the white corolla shorter. (926.)

GILIA LEPTOMERIA, Gray; *l. c., p.* 278. Annual, low, (3–6′,) diffusely much branched, obscurely glandular, otherwise glabrous; radical leaves spatulate or lanceolate, slightly pinnatifid with short pointed lobes, the cauline

alternate, mostly linear and entire, reduced on the branches to minute bracts; flowers numerous, very loosely panicled, the slender pedicels sometimes shorter than the calyx; corolla nearly white, slender funnelform, approaching salverform, 1½″ to at length 3″ long, the tube from once becoming twice the length of the calyx and of the ovate sometimes sinuate-toothed lobes; stamens inserted in the sinuses, shorter than the lobes; ovules numerous; seeds small, ⅛″ or less in length, the close coat without mucilage or spiricles.—Resembling depauperate forms of *G. inconspicua*, but well marked by the narrower corolla and by the seeds. Truckee Pass of the Virginia Mountains, near Humboldt Lake, and in Unionville Valley, Nevada, and on Stansbury Island in Salt Lake; May, June. PLATE XXVI. Fig. 6. A plant; natural size. Fig. 8. A young flower. Figs. 7 and 9. Older flowers, with elongated corollas. Fig. 11. Mature opened capsule; all enlarged four diameters. (927.)

GILIA MICROMERIA, Gray; *l. c., p.* 279. Annual, nearly glabrous, lax and slender, 2–4′ high, diffusely much branched; radical and lower cauline leaves pinnatifid with oblong obtuse divaricate lobes, on the branches linear and entire; flowers minute, scattered on long and capillary spreading or at length recurved pedicels; corolla nearly white, oblong-campanulate, 1″ long, little exceeding the calyx, the lobes short; stamens inserted nearly in the sinuses, shorter than the corolla; capsule globose, longer than the style, cells about 6-ovuled; seeds as in the last.—Truckee Valley, and near Humboldt Lake, and in the East Humboldt Mountains, Nevada; 4–6,000 feet altitude; May–July. PLATE XXVI. Fig. 12. A plant; natural size. Fig. 13. A flower; enlarged eight diameters. Fig. 14. The corolla, laid open. Fig. 15. Mature capsule; enlarged four diameters. (928.)

GILIA CAMPANULATA, Gray; *l. c., p.* 279. Annual, small, 1–2′ high, spreading, somewhat viscid-pubescent; lower leaves lanceolate, sparingly pinnatifid-toothed, on the branches linear-lanceolate, sometimes entire; flowers loosely panicled on slender pedicels often shorter than the flower; corolla nearly white, 3–4″ long, campanulate, moderately 5-lobed, twice longer than the calyx, the included stamens inserted into the broad base; anthers oblong; capsule globose, cells about 7-ovuled.—Sandy sage-plain near the Big Bend of the Truckee, Nevada; May. PLATE XXVI. Fig. 16. Plant; natural size. Fig. 17. Flower, laid open; enlarged two diameters. Fig. 18. Mature capsule; enlarged four diameters. (929.)

POLEMONIUM CONFERTUM, Gray; *l. c., p.* 280. Perennial, a span or less

high, from a tufted creeping rootstock, glandular-viscid and musk-scented; leaflets small and numerous, 1–4″ long, mostly as if whorled or fascicled, being 2–5-divided and sessile, the segments varying from round-oval to linear-oblong; flowers capitate-crowded, or in fruit racemose-spicate, honey-scented, nodding; calyx-lobes narrow, the cylindric or oblong tube twice longer; corolla 8″–1′ long, blue, the narrow-funnelform tube exceeding the calyx and mostly 2–3 times longer than its rounded lobes; filaments barely hairy and scarcely dilated at base.—Rocky Mountains, latitude 38–49°, and in the Sierras; alpine. In the Wahsatch and Uintas, on rocky peaks; 12,000 feet altitude; August. (930.)

Var. MELLITUM, Gray. Laxer both in leaflets and in inflorescence, with the paler or whitish corolla 1′ long, the lobes one-fourth the length of the narrow tube.—Rocky Mountains of Colorado. East Humboldt Mountains, Nevada, on a rocky peak; 10,500 feet altitude; August. (931.)

POLEMONIUM CÆRULEUM, L. *Gray, l. c., p.* 281. New York and New Jersey, rare; common from the Rocky Mountains to California, Alaska and the Arctic regions. Glabrous or viscid pubescent; corolla most usually blue; the seeds angled and often more or less winged. On stream banks and in meadows, Huntington and Ruby Valleys, Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; June–August. (932.)

Var. FOLIOSISSIMUM, Gray. Very viscid-pubescent; stems 2° high with the corymbose branches very leafy to the top; leaflets frequently confluent on a wing-margined rachis; stamens and style mostly shorter than the smaller white corolla, which is twice or more longer than the calyx.—In the Rocky Mountains, from Wyoming to New Mexico. East Humboldt Mountains, and in the Wahsatch; 7–9,000 feet altitude; June–August. (933.)

POLEMONIUM MICRANTHUM, Benth. *Gray, l. c., p.* 282. Annual, somewhat viscid-pubescent, branching, weak and diffuse, 3–8′ high; leaflets simple, 5–13, obovate or lanceolate, 2–4″ long; flowers scattered or solitary on the branches; calyx deeply 5-cleft, decidedly longer than the white or whitish almost rotate corolla; filaments nearly naked, somewhat dilated at base; ovules 2–3 in each cell.—Nearly prostrate and much resembling an *Ellisia.* Washington Territory. On damp foot-hills near Carson City, Nevada; 4,500 feet altitude; April. (934.)

## CONVOLVULACEÆ.

Calystegia sepium, R. Br. From Florida to Canada and the Saskatchewan; New Mexico, Southern Idaho, (Burke,) and on the Western Coast from the Columbia to Southern California, but rather rare. Humboldt Pass, Nevada, and in the Wahsatch; 5–6,000 feet altitude; July–September (935.)

Cressa[1] Cretica, L. Stem branched, scarcely 1° high, canescent; leaves ovate, acute, obtuse at base, sessile, crowded, hoary-pubescent, 2–3″ long; flowers subsessile in the upper axils, spicate or capitate; sepals ovate-lanceolate, 1–2″ long; corolla scarcely longer. Var. Truxillensis, Chois. *DC. Prodr.* 9. 140. "Stems elongated; leaves oblong and smaller; capsules 4-seeded."—Northern Mexico and Southern California. American specimens in Herb. Gray., which are all referred to this variety, show the leaves quite variable in size and shape, the flowers nearly sessile or on pedicels 2–3″ long, and the seeds in some cases solitary, large and oblong, in others 4, (as in these specimens, which agree well with South American ones,) small and compressed. Banks of Bear River near Brigham City, Salt Lake Valley; October. (936.)

Cuscuta tenuiflora, Eng. From Illinois and Missouri to the Upper Missouri; New Mexico, Arizona, and Washington Territory, (Lyall.) Humboldt Pass, Nevada; 6,000 feet altitude; September; on *Aster* and *Calystegia.* (937.)

Cuscuta Californica, Chois. *Engelmann's Rev. Cusc., Trans. St. Louis Acad.* 1. 499. Flowers on slender pedicels, loosely paniculate; calyx small, turbinate, 5-cleft, with triangular or lanceolate, acute or acuminate and sometimes recurved lobes; corolla-lobes very slender, lance-linear, acute or acuminate, erect or spreading, in fruit mostly erect or connivent; scales wanting or indicated by a narrow membrane connecting the adnate bases of the filaments; styles capillary, unequal, at least equaling the small usually globose ovary; stigmas capitate; capsule indehiscent, baccate, enveloped by the corolla; seeds often solitary, subglobose, strongly hooked, ½″ long. Var. graciliflora, Eng. Flowers slender, 1½–2½″ long, the corolla-tube as long as the very narrow lobes and often exceeding the calyx; filaments often short, or equaling or exceeding the linear-oblong anthers; styles equaling or much

[1] Cressa, L. Sepals 5. Corolla funnelform, 5-cleft. Stamens exserted. Styles 2; stigmas capitate. Ovary simple, 2-celled, 4-ovuled. Capsule dehiscent, 2-celled, 1–4-seeded. Embryo cotyledonous. Chois. *DC. Prodr.*

exceeding the ovary.—California. East Humboldt Mountains, Nevada, Jordan Valley and in the Wahsatch, Utah; 5–7,500 feet altitude; July, August. An early specimen, probably the same, was collected in Truckee Valley. Indiscriminate in its attachments, scarcely two of the numerous specimens growing on plants of the same genus. (938.)

Var. (?) SQUAMIGERA, Eng.; *l. c., p.* 499. Flowers 2–2½″ long, on shorter pedicels, in rather crowded subglobose clusters; calyx-lobes lanceolate, acuminate, equaling the open funnelform corolla-tube; corolla-lobes lanceolate, as long as the tube, at last spreading; anthers oblong-linear, cordate at base, on very short filaments; scales spatulate, fringed, shorter than the tube, incurved; styles as long as the very acute ovary; capsule apiculate, 1-seeded, enveloped below by the corolla-tube.—Collected by Remy in Southern Utah, near the Rio Virgen, on *Suæda.* Intermediate between this species and *C. subinclusa*, Dur. & Hilg.

## SOLANACEÆ.

SOLANUM NIGRUM, L. Unionville Valley, Nevada. Introduced. (939.)

SOLANUM UMBELLIFERUM, Esch. *DC. Prodr.* 13. 93. Pubescent throughout; stem shrubby, 6° high, angled, fistulous, branches pendent; leaves petioled, ovate, acute, entire, 1–1½′ long; flowers in terminal 4-(sometimes 2–3-) flowered umbels, with a small urceolate entire involucre; peduncles equal, elongated; calyx urceolate, 5-cleft, with acute lobes; corolla thrice longer than the calyx, pale-violet, 5-cleft, at first subcampanulate, afterward rotate; filaments very short, broader at base; anthers yellow, at first terminally, then laterally dehiscent; style straight; stigma capitate; berry large, purple.—California; varying much in the size and form of the leaves and degree of pubescence. Collected by Anderson near Carson City, with the calyx-lobes rather obtuse.

PHYSALIS PUBESCENS, Willd. Florida to New England and west to New Mexico, Arkansas, the Upper Platte and Missouri, and Lake Winnipeg. Wahsatch Mountains, Utah; 5,000 feet altitude; May. (940.)

ORYCTES[1] NEVADENSIS. Small, 2–4′ high, scurfy and viscid-pubescent;

[1] ORYCTES. Calyx herbaceous, 5-cleft, not becoming inflated. Corolla tubular, with a short equally 5-toothed scarcely spreading border. Stamens 5, equal, or 1 or 2 shorter, with elongated filiform filaments inserted at the base of the tube; anthers rounded-cordate, the cells oblong, free below the insertion of the filament. Style somewhat dilated upward; stigma capitate, emarginate. Capsule sessile, globose, 2-celled, membranous. Seeds numerous, flattened, orbicular, margined, the testa reticulate; hilum lateral; embryo straight, short, terete, at the base of the small albumen; cotyledons short.—A low annual, erect, branched; leaves petioled; flowers pedicelled, in axillary umbels.

leaves 1–2′ long, ovate, oblong or lanceolate, attenuate into the petiole, entire, undulate-margined; flowers small, in axillary umbels of 3–4, on short pedicels; calyx 1½–2″ long, campanulate, the ovate acutish lobes twice longer than the tube, enlarging in fruit and equaling the capsule; corolla 3″ long, blue or purplish, plicate in æstivation, scarcely at all dilated above, the lobes short, triangular, erect; stamens and style nearly equaling the corolla, or some of the stamens shorter; capsule 2½″ in diameter; seeds 10–20, 1½″ broad, narrowly margined, the cavity of the flattened testa much exceeding the small albumen.—On stony barren foot-hills near the Big Bend of the Truckee, Nevada; May. The specimens are young but sufficiently mature to show the distinctive generic characters. Its affinities are with the *Petuniæ* of Miers. PLATE XXVIII. Fig. 5. Plant; natural size. Fig. 6. Flower. Fig. 7. Corolla, laid open. Fig. 8. Mature ovary; all enlarged four diameters. Fig. 9. Seed, enlarged eight diameters. Fig. 10. Albumen and embryo; enlarged sixteen diameters. (941.)

LYCIUM PALLIDUM, Miers. *Gray's Rev. Lyc., Proc. Amer. Acad.* 6. 45. A shrub, 3–4° high, glabrous, spiny; leaves ½–1½′ long, oblong- or obovate-spatulate, with a very narrow base, acute or obtuse, fascicled; calyx broad-campanulate, 5-cleft to the middle or deeper, the lobes 1½–2″ long, sub-foliaceous, spreading, lanceolate to ovate and often very obtuse, exceeding the tube; corolla 9–10″ long, tubular-funnelform, greenish; filaments and corolla glabrous within, or somewhat hairy or hirsute; anthers terminating in a deciduous mucro; fruit 4–5″ in diameter.—New Mexico; Arizona; Southern Utah, (Dr. Palmer, 1870.)

LYCIUM ANDERSONII, Gray. *Proc. Amer. Acad.*, 7. 388. Glabrous; leaves 1½–3″ long, spatulate, fleshy; calyx short-campanulate, usually shorter than the (1½″ long) pedicel, the margin repandly-toothed or denticulate; corolla narrowly tubular, nearly ½′ long, the throat somewhat dilated, lobes 4, very broad, much shorter than the tube, equaling the anthers; filaments glandular-pilose at base.—A thorny diffusely branched shrub, with much the appearance of *Sarcobatus*, 2–3° high; berries red, globose, 2–3″ in diameter, with a membranous 4–5-lobed disk surrounding the base.—Discovered by Dr. Anderson in Southeastern Nevada. Carrington Island, in Salt Lake; in fruit, June. The most northern locality in which any American species has been found. (942.)

Datura Stramonium, L. Wahsatch Mountains, at the mouth of Cottonwood Cañon. Introduced. (943.)

Nicotiana attenuata, Torr., in Herb. Annual, glutinous-pubescent or somewhat glabrate, erect, 1–3° high, branched; leaves oblong-lanceolate, the uppermost linear, acuminate, attenuate into a petiole, entire or obscurely repand-dentate; flowers in loose terminal racemes; calyx 3″ long, tubular-campanulate, teeth short, triangular, acute, equal; corolla narrow-funnelform, 1′ long, the short (2″) limb spreading or more usually erect and closed, the lobes short and obtuse; capsule 3–5″ long, exceeding the calyx, ovate, acute, 2-valved, valves bifid.—Lower leaves 4–6′ long and 1–2′ wide, proportionately narrower above; capsule becoming half-longer than the calyx; seeds pitted. A quite distinct species, rather common in the valleys and dry lower cañons of Nevada. It is 38 and 289 Anderson, from near Carson City; 354 Torrey from Lake Washoe; 75 Xantus from Fort Tejon, Southern California; also found by Vasey on Bear Creek, 12 miles west of Denver, and by Palmer in Southern Utah. *N. ipomopsiflora* is somewhat similar but has sessile clasping and more oblong leaves, and the flowers are in long secund racemes. Plate XXVII. Fig. 1. A branch and portion of the stem; natural size. Fig. 2. A lower leaf; full size. (944.)

Nicotiana Bigelovii. (*N. plumbaginifolia*, Var. (?) *Bigelovii*, Torr. *Pac. R. R. Surv.*, 4. 127.) Leaves sessile, attenuate at base; calyx glandular-pubescent, with unequal lance-linear lobes; corolla 2′ long, tubular-funnelform, the elongated tube 2–3 times longer than the calyx, the lobes broad-ovate, subacute; capsule obtuse, usually 4–6″ long, shorter than the calyx; otherwise much like the last.—Collected by Bigelow, Frémont, (481, 1846,) and Torrey, (355,) in California, and by Anderson, (268,) in Western Nevada. Much resembling *N. noctiflora*, of Chili, but the leaves are more attenuate at base and the corolla-lobes are not at all obcordate. Plate XXVII. Fig 3. Extremity of a branch. Fig. 4. A lower leaf; natural size.

## GENTIANACEÆ.

Erythræa Nuttallii. Erect, loosely branched; leaves linear-oblong, 6–12″ long, acute, not rosulate at base; panicle loose, dichotomous, few-flowered; flowers on elongated slender peduncles; calyx-lobes narrowly subulate, acute, a little shorter than the corolla-tube; corolla pink, contracting over the capsule and usually becoming somewhat twisted; lobes elliptic-

oblong, 2–3″ long, more or less acute; stigma somewhat cup-shaped, slightly 2-lobed; capsule 4–7″ long, becoming nearly twice longer than the calyx; seeds oblong or roundish, minutely pitted.—Stem 3–12′ high, branching from the base or only toward the top. Nearly *E. Chilensis,* but with larger flowers, longer capsule and less lobed stigma; easily distinguished from other western species by its loose few-flowered habit and long peduncles. It is *E. longiflora, E. elata,* and *E. tenella,* of Nutt. Mss., from Northern Utah and Southern Idaho, and 29 Anderson from near Carson City. As none of Nuttall's proposed names are always appropriate, the species is best dedicated to himself. Found in Unionville, Huntington, and Ruby Valleys, Nevada; 4,500–6,000 feet altitude; August–October. PLATE XXIX. Figs. 1, 2. Plants; natural size. Fig. 3. Calyx, expanded. Fig. 4. Corolla, laid open. Fig. 5. Ovary; all enlarged two diameters. Fig. 6. Seed; enlarged eight diameters. (945.)

GENTIANA AMARELLA, L. *DC. Prodr.* 9. 95. Stem slender, erect, branched; lowest leaves oval- or oblong-spatulate, upper ones ovate or ovate-lanceolate, sessile and subclasping, margins scabrous; cyme usually compound and raceme-like; calyx 5-cleft, lobes lanceolate, somewhat unequal, shorter than the corolla-tube; corolla pale-blue, without folds, fringed at the base of the limb, lobes elliptic-lanceolate, shorter than the tube; ovary oblong-linear, sessile.—There can be no doubt of the identity of *G. acuta* and *G. tenuis* with this species, as pointed out by Dr. Hooker and Dr. Engelmann. None of the points of difference indicated by Grisebach—the nearly connate leaves, their shape, the thinner beard, the smaller flowers with shorter and more unequal calyx, the more angular taller and more branched stem—are at all constant. From the mouth of the St. Lawrence westward to the Pacific and northwest to Great Bear Lake and Unalaska; Rocky Mountains of Colorado and Wyoming, and the Sierras of Northern California. The present specimens are a subalpine form, 2–10′ high; leaves broad and mostly obtuse; flowers variable in size, 3–6″ long, rather few and scattered; calyx cleft nearly to the base, the lobes sometimes very unequal; corolla with abundant fringe, no glands, lobes more or less acute.—East Humboldt Mountains, Nevada, and in the Uintas; 8–9,500 feet altitude; July, August. (946.)

Var. STRICTA. (*G. acuta,* Mx., Var. *stricta,* Griseb. *DC. Prodr.* 9. 96.) Stem 2–4° high; cymes axillary, strict, elongated, erect.—Huntington and Ruby Valleys and near Humboldt Pass, Nevada; 6,000 feet altitude; August,

September. Much branched or nearly simple; leaves narrower in proportion than in the last and flowers rather smaller, more numerous and crowded; corolla-lobes acute or obtuse; obscure glands are sometimes found at the base. (947.)

GENTIANA HETEROSEPALA, Eng. *Trans. Acad. St. Louis*, 1. 215. Annual, low, erect, simple, few-flowered, glabrous; lowest leaves obovate-spatulate, upper ones ovate, broad at base, sessile, acute or subobtuse, margin minutely scabrous; flowers short-peduncled; calyx 5-cleft, two of the lobes large, ovate, acute, nearly equaling the corolla, the remaining three shorter and linear-subulate; corolla with obscure glands at base, sparingly bearded, the lobes linear-oblong, obtuse, spreading, half as long as the tube; anthers ovate-cordate; pistil linear.—The specimens are much larger than the original ones of Engelmann, 4–16′ high, and with a rather full beard, but the characters of the calyx hold good; leaves ½–1½′ long, upper ones oblong-lanceolate; flowers solitary or fascicled in the axils, on unequal (3″–1½′) and often long peduncels or subcymose upon a common peduncle, pale-blue, 6–8″ long; hairs of the fringe in two fascicles at the base of each lobe. Wahsatch and Uinta Mountains, Utah; 8–8,500 feet altitude; July, August. (948.)

GENTIANA DETONSA, Fries. This is referred to *G. crinita* as a variety, but, as the older species, should be retained. From Canada and the Lakes to the Arctic Ocean, (Point Barrow, Fort Youkon,) and Rocky Mountains; Southern Idaho, (Tolmie;) Colorado, (Hall & Harbour.) Ruby and Huntington Valleys, Nevada, and Bear River Valley in the Uintas; 6–8,000 feet altitude; July, August. (949.)

GENTIANA FRIGIDA, Hænke. *DC. Prodr.* 9. 111. Perennial, with a single ascending stem; leaves spatulate-linear, obtuse, not cartilaginous and nearly smooth on the margin, flowers subsolitary, terminal; calyx 5-cleft, the lobes oblong-linear, half as long as the corolla; corolla plaited, glandless and beardless, narrowly obconic, whitish with blue spots, the lobes short, ovate, three times longer than the folds; anthers free, erect; testa slighty winged; capsule at length stipitate. Var. ALGIDA, Pall. Stem taller but low; leaves broader; flowers several, pedicelled, twice larger; calyx somewhat unequal and sometimes split.—The specimens are not yet in flower, but are evidently the same as the form collected in the Rocky Mountains of Colorado, considered by Engelmann intermediate between the European *frigida* and the Siberian variety. 3–6″ high; radical leaves often 3–4′ long and 2–4′ wide, cauline

ones 1–1½″ long; flowers 2–3, sessile or shortly pedicelled, terminal and occasionally also axillary, 2′ long; corolla-lobes very acute, greenish-blue, punctate, the folds truncate and crenate. Uinta Mountains, above head of Bear River; 12,000 feet altitude; August. (950.)

Gentiana affinis, Sm. Perennial; stems clustered, ascending; lower leaves obovate-oblong, obtuse, the upper lanceolate, rather acute, scabrous upon the margin; flowers solitary and pedicelled or clustered and subsessile; bracts nearly equaling the calyx; calyx 5-cleft, lobes oblong-linear or sometimes dilated, unequal, about equaling the entire or variously cleft tube; corolla blue, beardless and glandless, narrowly clavate, open, twice longer than the calyx, the lobes oblong-lanceolate, obtuse, thrice longer than the cleft folds; anthers free; testa slightly winged.—Quite variable; stems 10–20′ high, 1-flowered, or the solitary axillary flowers (10″–1′ in length) on long pedicels, or the axillary peduncles several-flowered and much reduced in length; calyx-lobes very variable, sometimes almost none, and rarely wholly occupying the truncate border of the tube; stigmas connate or twisted or diverging; capsule on a stipe nearly equaling the calyx-tube; seeds orbicular or oblong, winged or wingless. From the Red River and Saskatchewan west to Washington Territory and southward into California, Utah and New Mexico. Ruby, Huntington, and Goose Creek Valleys, Nevada, and Bear River Valley in the Uintas; 6–8,000 feet altitude; July–September. (951.)

Gentiana Parryi, Eng. *Trans. Acad. St. Louis*, 1. 218. Perennial; stems one or several, ascending or erect, 4–9′ high, simple, leafy, few-flowered; leaves somewhat glaucous, broad at base, rounded-ovate, ovate or ovate-lanceolate, 10–15″ long and 3–10″ wide, subobtuse or acute, spreading, the uppermost narrow, carinate and boat-shaped, involucrate to the sessile large bluish-purple flowers; calyx 5-cleft, membranous, entire or sometimes more or less slit, the lobes linear, shorter than the tube; tube of the open corolla obconic, twice longer than the calyx, the erect broadly obovate lobes very shortly acute, scarcely exceeding the bifid folds; ovary lanceolate, stipitate.—Flowers 15-18″ long, very deep purple, greenish below, the lobes a third as long as the tube, widening upward. Colorado and Utah. Clover Mountains, Nevada, and in the Uintas; 10,000 feet altitude; August, September. (952.)

Frasera speciosa, Dougl. *Hook. Fl. Bor.-Am.* 2. 66, *t.* 153. Stem stout, erect, 3–5° high, strict, usually simple, glabrous; leaves in fours, thick,

acutish, 7–9-nerved, the lowest oblong-lanceolate, 6–9′ long and 2′ wide, attenuate into a long petiole, the cauline connate at base and the uppermost linear; the racemose cyme densely flowered, elongated; calyx-segments linear, acuminate, equaling the whitish punctate corolla; glands in pairs, elliptic-oblong; filaments dilated at base, scarcely united; style about equaling the ovary.—Biennial; stem not sulcate, often flowering to the base, thick and succulent with a large pith; peduncles axillary, somewhat in fours, unequal, simple and 1-flowered or umbellate at the summit; flowers 1′ in diameter, the petals bearded at base between the filaments. In the mountains from Washington Territory to Wyoming, Colorado, and New Mexico, (Fendler;) Sierras at head of Carson River, (C. D. Gibbs; *Tesseranthium radiatum*, Kell.) In the Diamond and East Humboldt Mountains, Nevada, and in the Wahsatch, usually on divides and sometimes abundant; 7–8,000 feet altitude; June, July. (953.)

FRASERA ALBOMARGINATA. Slender, 2–3° high, glabrous, branching into an open panicle; branches and branchlets verticillate in fours or sometimes opposite; leaves verticillate in fours, narrowly oblanceolate, 2–4′ long, 3–5″ wide, obtuse or acute, margined with a silvery-white line and more or less undulate; upper leaves and bracts lanceolate from a clasping base, acuminate; pedicels spreading, ½–2′ long; calyx-lobes 2–3″ long, ovate-lanceolate; corolla 9″ in diameter, the petals broad-oblong, acute, greenish yellow, dotted with black above the middle, the base deeper green; gland linear-oblong, fringed with a villous border, expanding at the top into a broad obcordate deep-green villous spot—Near St. George in Southern Utah, (Dr. Palmer, 1870.)

SWERTIA[1] PERENNIS, L. *DC. Prodr.* 9. 132. Perennial; stems from running rootstocks, erect, 6–15′ high, few–many-flowered; lower leaves oblong-elliptic, long-petioled, the cauline ones opposite, ovate-oblong, obtusish; flowers erect, 6–8″ in diameter; corolla-segments coriaceous, grayish-blue with darker spots, elliptic-oblong, acutish, twice longer than the lanceolate calyx-lobes; glands in pairs, orbicular, the fimbriate crest distinct; stigma reniform, sulcate; seeds winged.—Leaves either alternate or opposite. Kodiak, Alaska; Wind River Mountains, (Frémont;) Rocky Mountains of Colo-

[1] SWERTIA, L. Flowers 5- (or sometimes 4-) merous. Calyx-segments united at the very base, valvate. Corolla withering, rotate, without corona or folds, glands fimbriate on the margin. Stamens inserted on the throat; filaments equal at base; anthers at length incumbent, nodding. Stigma terminal, seated on the ovary, continuous, emarginate-reniform. Capsule 1-celled, 2-valved, septicidal. Seeds numerous, attached to the valves. DE CANDOLLE.

rado. Clover Mountains, Nevada, and in the Uintas; subalpine and alpine meadows; 8–10,000 feet altitude; July–September. (954.)

Menyanthes trifoliata, L. New England to Pennsylvania and Wisconsin, northward to Newfoundland, Labrador, Hudson's Bay and the Saskatchewan; Sitka, Washington Territory, and Sacramento Valley. Ruby Valley, Nevada; flowerless stems; 6,000 feet altitude. (955.)

Hesperochiron[1] Californicus. (*Ourisia Californica*, Benth. *Plant. Hartw., p.* 327.) More or less hirsute-pubescent; leaves clustered upon the summit of a short fusiform root, oblong or ovate, attenuate into a somewhat dilated fleshy petiole, obtuse, entire or obscurely repand-dentate, ciliate, 1–2′ long; peduncles naked, 1-flowered, shorter than the leaves; calyx-segments 3″ long, oblong, pubescent; corolla 5–8″ long, more or less deeply cleft, the limb somewhat oblique, the tube and filaments somewhat hairy.—Pubescence rather variable, the surface of the leaves and sepals occasionally smoothish. An abnormal genus in some of its characters, its æstivation and the inequality of the corolla-lobes and stamens suggesting an affinity to the *Scrophulariaceæ*, with which it was placed by Bentham without an examination of the ovary. It is, however, doubtless more nearly a *Villarsia*. Indeed, the *V. pumila* of Grisebach, (*Hook. Flor. Bor.-Amer.* 2. 70, *t.* 157; the corolla more open and somewhat rotate, the tube densely hairy within, and the leaves and calyx more glabrous,) is very similar and is probably either a second species or may prove to be but a form of the present one. From the Columbia River to the Sacramento, (1875 Hartweg, 379 Frémont, Cronkhite, and Lyall,) the "Snake Country," (Tolmie,) and near Carson City, (Anderson.) Found in the latter locality, in grassy meadows; 5,000 feet altitude; April. Plate XXX. Fig. 1. A rather large plant; natural size. Figs. 2, 3. Flowers, different forms. Fig. 4. Flower, laid open; enlarged two diameters. Fig. 5. Stamen. Fig. 6. Ovary. Fig. 7. Mature capsule. Fig. 9. Seeds; all enlarged four diameters. Fig. 8. Section of ovary; enlarged eight diameters. (956.)

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[1] HESPEROCHIRON. Calyx 5- (sometimes 6–7-) parted, the segments unequal. Corolla rather narrow campanulate, without either glands, corona or folds, the limb 5- (sometimes 6–7-) cleft, slightly bilabiate and more or less spreading, the segments subequal, imbricate in æstivation. Stamens as many as the corolla-lobes, inserted at the base of the tube, unequal; filaments fleshy, attenuated upward; anthers oval, erect, cordate at base, 2-celled, cells laterally dehiscent. Ovary 1-celled, surrounded at base by 5 obscure glands, the numerous ovules attached in 2 rows to the sutural placentæ. Styles united nearly to the apex, persistent; stigmas entire. Capsule 1-celled, loculicidally dehiscent, 2-valved, valves entire. Seeds wingless, ovate, roughened.—A perennial or biennial acaulescent herb.

## APOCYNACEÆ.

Apocynum androsæmifolium, L. Mostly glabrous throughout. From North Carolina to Hudson's Bay and west to Kansas and the Saskatchewan, and from Washington Territory to the Sacramento. East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–8,000 feet altitude; July, August. (957.)

Apocynum cannabinum, L. 3–6° high; cauline leaves 4′ long or more and 2′ broad, sessile and amplexicaul, the rameal ones much smaller and petioled; glabrous. Used by the Indians as a substitute for hemp in making nets, &c. From Florida to Canada and Winnipeg Valley, and west to New Mexico, Sonora and California. On the Humboldt River and on stream-banks in the West Humboldt Mountains, Nevada, and shores of Salt Lake; 4–5,000 feet altitude; June–September. (958.)

## ASCLEPIADACEÆ.

Asclepias fascicularis, Decne. *DC. Prodr.* 8. 569. Stems erect, glabrous, 3–5° high; leaves crowded in fours or fives, 2–5′ long, short-petioled, linear, mucronulate, glabrous, uniform in color, not revolute, subcoriaceous, nerves thick beneath; peduncles shorter than the leaves, umbeled, densely flowered; pedicels and flowers softly puberulent; corolla-lobes ovate, reflexed, about equaling the pedicels; hoods ovate upon the back; horns falciform, acute; crown stipitate; pods smooth, narrow, 2½′ long and 2½″ wide.—Differing from *A. verticillaris* only in its less pubescence, more densely flowered umbels, more distant whorls of leaves and stouter habit. Oregon to Southern California. West Humboldt Mountains, Nevada; 5,000 feet altitude; August, September. (959.)

Asclepias speciosa, Torr. *DC. Prodr.* 8. 571. (*A. Douglasii*, Hook., *DC., l. c.*, 564.) Tomentose; stem simple, 2–5° high; leaves 4–8′ long, cordate-ovate, acute, short-petioled, or the uppermost sessile; umbels axillary and terminal, solitary, many-flowered, the short peduncles and the pedicels densely tomentose; flowers light-purple; corolla-lobes ovate, acutish, reflexed; hoods of the crown 6″ long, ovate, long-acuminate, bidentate at the base within, thrice longer than the stigma and the compressed incurved horn; pods 4′ long, 1′ in diameter.—From Washington Territory and Northern California to Dakota, Colorado and New Mexico. The prevalent species of

the valleys of Nevada and Utah; 4–6,000 feet altitude; July–September. (960.)

Asclepias cryptoceras. (*Anantherix speciosa*, Nutt., in Herb.; *Acerates latifolia*, Torr. *Frém. Rep.* 317.) Glabrous; stems decumbent, 6–10′ long, simple; leaves 3–4 pairs, rounded ovate, 1½–2′ long, on very short petioles; umbels axillary and terminal, sessile, few-flowered; corolla-lobes ovate-lanceolate, spreading, greenish-yellow, 5″ long; hoods of the crown 3″ long, equaling the disk, purple, ovate, abruptly pointed with two short recurved beaks; horn short, incurved, not at all exserted.—Fruit unknown; easily mistaken for an *Acerates*. Found by Nuttall on Ham's Fork of Green River, Utah, and by Frémont (584) in Southeastern Idaho. West Humboldt Mountains, Nevada, near Humboldt Lake, rare; 5,000 feet altitude; May, in flower. Plate XXVIII. Fig. 1. Stem; natural size. Fig. 2. Flower. Fig. 3. Hood, divided between the beaks and showing the included horn; both enlarged two diameters. Fig. 4. Pollen masses; enlarged sixteen diameters. (961.)

Acerates decumbens, Decne. *DC. Prodr.* 8. 522. Stems 1–2° long, numerous, decumbent, sometimes angular; leaves scattered and subopposite, ovate-lanceolate or more usually narrow-lanceolate, (6′ long, ½–1′ wide,) acute, margins scabrous; umbels terminal, subglobose; corolla-lobes ovate, greenish-yellow; hoods purple, equaling the lobes and exceeding the disk; pods smooth, 4′ long, 1′ in diameter.—From Western Texas and Arkansas to Arizona and Utah. On Stansbury Island and in Jordan Valley; June–August. (962.)

## OLEACEÆ.

Fraxinus anomala, Torr., in Herb. Branchlets and petioles pubescent; leaves simple, broadly cordate or ovate, abruptly acute or emarginate, 1–1½′ in diameter, longer than the petiole, entire, more or less pubescent beneath; fruit wing-margined the entire length, 6–10″ long, oblong, cuneate at base, and acutish or emarginate above; calyx less than 1″ long, persistent at the base of the fruit; seeds 1–2, 3–4″ long.—A small tree, 15° high, first discovered by Newberry on Macomb's Expedition in 1859 in Labyrinth Cañon on the Colorado River, Utah, and again recently collected by Palmer near St. George on the Rio Virgen in the southwestern portion of the State. The fruit is occasionally triangular, 3-winged, and 3-seeded.

Fraxinus viridis, Mx. Collected also by Dr. Palmer in the same region; branchlets, petioles and midveins finely pubescent.

## NYCTAGINACEÆ.

Mirabilis[1] Californica, Gray. *Bot. Mex. Bound.* 173. Glabrous or more or less viscid-pubescent; stems several from a woody base, 1–2° long, ascending, branches spreading; leaves 6–15″ long, fleshy, rounded-ovate, subcordate at base, obtuse on short pedicels, the floral ones subsessile; involucre 1-flowered, 5-cleft, segments triangular-ovate, acute, somewhat unequal; perianth rose-color, rather small, (3″ long,) campanulate-rotate, the lobes emarginate; stamens usually 5, exserted; fruit smooth, ovate, 1½″ long.—Southern California and Western Arizona. Virginia and Pah-Ute Mountains, Nevada; 5–6,000 feet altitude; June, July. (963.)

Oxybaphus angustifolius, Sweet. *Gray, l. c.*, 175. Stems glabrous, ascending, slender, 1–6° high; leaves glabrous, linear, usually elongated, (2–4′,) repand, thick, glaucous; peduncles and involucre pubescent; flowers loosely panicled; involucre with 5 triangular or ovate acutish lobes, 3–5-flowered, becoming 5″ long in fruit; perianth short, subcampanulate or rotate-funnelform, scarcely exceeding the involucre, the limb 1½″ long; stamens exserted; fruit hoary pubescent, 2½″ long.—From Western Texas and Chihuahua to Southern Idaho, Nebraska and Minnesota. Foot-hills of the Wahsatch, from Salt Lake City to Provo City; May–August. (964.)

Abronia[2] fragrans, Nutt. More or less viscid-pubescent; stems several, herbaceous from a perennial root, ascending, ½–1½° high; leaves oblong or ovate, 1–2½′ long, truncate or more or less cuneate at the base, obtuse or acutish; peduncles mostly solitary, elongated; bracts of the involucre large, broadly ovate, white and scarious, obtuse or acute, 4–9″ long, often equaling the whitish flowers; stamens unequal; stigma clavate; fruit 3–6″ long, coriaceous, with narrow undulate coarsely reticulated wings, not crested, often

[1] Mirabilis, L. Involucre herbaceous, scarcely changed in fruit, calyx-like, of united leaves, 5-lobed, 1–12-flowered. Calyx tubular or more or less broadly funnelform. Stamens almost always 5, united within the persistent base of the calyx. Stigma capitate, granulated. Fruit indurated, smooth, ovoid, not angled and scarcely or not at all ribbed. Seed straight, with incurved embryo, inferior radicle, and foliaceous cotyledons.—Herbs with jointed stems, opposite leaves, and flowers solitary in the axils or in crowded terminal clusters.

[2] Abronia, Juss. Involucre perfect, of 5–15 distinct leaflets, the head many-flowered. Calyx salverform with obcordate lobes. Stamens 5, included, adnate to the tube. Style included; stigma capitate or linear-clavate. Perfect fruit 5-winged. Seed cylindrical, smooth. Embryo by abortion monocotyledonous, enfolding the central mealy albumen.—Low herbs, with thick opposite petioled unequal leaves; peduncles axillary and terminal, and flowers in solitary involucrate heads.

very irregular and but 1–2-winged or wingless; seed 1½″ long.—Distinguished especially by its broad scarious involucre and its not indurated nor crested fruit; varying considerably in pubescence, the present specimens having rather more than usual. From Northern Arizona and New Mexico to Salt Lake Valley, the Platte, and Council Bluffs, Iowa. Foot-hills near Salt Lake City and sandy shore of Stansbury Island; 4–5,000 feet altitude; May, June. (965.)

ABRONIA TURBINATA, Torr., in Herb. Annual, viscid-pubescent; stems ½–1° long, prostrate or subascending; leaves ½–1½′ long, broadly ovate or oblong, glabrous or slightly pubescent on the margin, cordate, truncate, or sometimes cuneate at base, obtuse or rarely acute, sometimes sparingly sinuate-dentate, usually exceeding or about equaling the petioles; peduncles usually elongated and exceeding the leaves; involucral bracts 2–6″ long, mostly linear-lanceolate, acuminate; flowers numerous, 6–8″ long, pinkish; limb 5-parted, 4″ broad; stamens unequal; fruit 3–4″ long, thin-coriaceous, the narrow hollow wings crested above in the perfect fruit with transverse disks; seed 1″ long.—Body of the fruit not at all thickened and rigid, as in *A. umbellata* and *A. mellifera*, the wings frequently more or less aborted, but in the normal form straight and equal, each terminated by a circular disk. From New Mexico and Arizona to Southern California (?) and Nevada. It is 1710 and 601 Wright, and 93 Wislizenus, from New Mexico; was collected by Emory and Dr. Palmer in Arizona, and by Stretch and Dr. Torrey (455) in Western Nevada. Frémont's specimens from the Mohave River are probably the same. It may be the *A. speciosa* of Buckley, from Fort Belknap, New Mexico, but the description is too meager for the identification of the species. Carson and Humboldt Valleys, Nevada; May–August. PLATE XXXI. Fig. 1. A flowering stem; natural size. Fig. 2. Flower, laid open. Fig. 3. Fruit, divided longitudinally and showing the seed. Fig. 4. Transverse section of the wings. Fig. 5. Terminal disks; all enlarged two diameters. Fig. 8. Transverse section of seed. Fig. 9. Embryo; both enlarged eight diameters. Figs. 6, 7. Fruit of *A. umbellata;* enlarged two diameters. (966.)

ABRONIA CYCLOPTERA, Gray. *Sill. Jour., n. s.*, 15. 319. (*A. micrantha*, Torr. *Frém. Rep.* 96.) Annual, more or less glandular-pubescent, scarcely at all viscid; stems 2′–2° long, ascending; leaves oblong, ovate, or ovate-lanceolate, usually more or less cuneate at base, obtuse, the blade 1–2′ long, coarse-pubescent at least upon the margins and veins beneath; peduncles

mostly 2–4′ long, sometimes much shorter; involucre of 5 ovate or narrow-lanceolate acuminate subherbaceous bracts, 2–5″ long, 8–20-flowered; flower bright rose-color, 6–12″ long, the large limb (4–8″ broad) 4–5-parted with deeply emarginate lobes; tube pubescent; stamens 3–5, unequal; fruit 7–12″ long and 4–10″ wide, including the 2–4 (usually 3) semi-orbicular membranous strongly reticulated wings, which are united above the firm and rigid body; seed 2½–4″ long.—A showy handsome plant, beginning to flower very early. The fruit of the central flower is usually wingless. The specimens of the collection, like others from the same region collected by Dr. Torrey, Stretch, and Veatch, (*A. Crux-Maltæ*, Kell.,) are only in flower, showing immature fruit. They are alike in the broad 4-lobed and 4-androus flowers, the very slender tube green above and slightly dilated about the approximate anthers, the uppermost of which are in the very throat; the upper tube is often marked by minute white lines, (raphides?) From Northern Texas and New Mexico to the Platte; on the Saskatchewan, (Bourgeau.) Valleys of Western Nevada; May, June. (967.)

HERMIDIUM[1] ALIPES. Stems rather stout, ascending, branched, 1° high; leaves 1–2½′ long, broad-ovate, subcordate, obtuse or subacute, short-petioled; heads about 6-flowered; bracts 6–10″ long, cordate-ovate, acute, sessile, occasionally slightly united, more or less colored; perigonium deciduous, light-purple, campanulate, narrowed toward the base, about equaling the bract, somewhat 5-lobed, the 5 nerves leading to the sinuses; the slender filaments and elongated style about equaling the perigonium; stigma capitate; fruit (immature) globular, smooth; ovary apparently narrowly 3-winged.—From its bract-like involucres belonging technically to the suborder *Bougainvilleæ* of Choisy, but in the structure of the flower and fruit, (so far as appears from immature specimens,) wholly a *Mirabilis*. On low foot-hills from the Big Bend of the Truckee River to Oreana on the Humboldt; May. PLATE XXXII. Fig. 1. Portion of stem; uppermost head of undeveloped flowers opened out and showing imperfectly their position; natural size. Fig. 2. A single bract and flower. Fig. 3. Vertical section of immature ovary; enlarged four diameters. (968.)

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[1] HERMIDIUM. Involucre consisting of a single broad membranous bract below the base of each flower. Flowers in condensed head-like terminal and axillary racemes, the short pedicels adnate to the midveins of the bracts. Perigonium campanulate-funnelform. Stamens 5–7. Otherwise as in *Mirabilis*.—A fleshy herbaceous glabrous and glaucous perennial; leaves opposite, entire.

## CHENOPODIACEÆ.[1]

Chenopodium album, L. Throughout the United States to the Pacific and northward to Hudson's Bay and Bear Lake. It occurs in the collection in various forms, some of which are beyond doubt indigenous. The ordinary tall variety with large acutely-toothed leaves, (a form of Var. *heterophyllum*, Ledeb.,) was only collected in the Truckee Meadows, Nevada. (969.)

Specimens from Blue Spring Valley, Utah, 1° or more high, have the leaves less than 6″ long, ovate, rounded or very acute, entire, or the few teeth obtuse or acute; fruit in numerous dense approximate clusters as large as small peas, with the calyx very strongly keeled, nearly covering the seed; October. (970.)

Forms of Ledebour's Var. *integrifolium* are more frequent, and especially the Var. leptophyllum, Moq., with lance-linear or linear entire leaves, hoary-farinose, the branches of the panicle rather long and loose, the stems low, usually but 1° or often less in height. It has been found from Dakota to New Mexico and westward, by Nuttall, Nicolet, Gordon, Frémont, Wright, and others, and is certainly indigenous, though it appears to run into ordinary *viride* states of *C. album*. Carrington Island in Salt Lake, and on the East Humboldt Mountains, Nevada; 4,500 and 9,000 feet altitude. (971.) Larger specimens, approaching the same form, were collected in Truckee, Regan, and Diamond Valleys, Nevada; 4–5,500 feet altitude. (972.)

Chenopodium Fremonti. More or less farinose, 6′–3° high, diffusely branched; leaves oblong, ovate or broadly triangular, 4–15″ long, mostly hastate, abruptly attenuate into a slender petiole; panicle loose and spreading with short bractlets; calyx-lobes carinate-cucullate; seed horizontal, smooth, and shining.—Collected by Frémont on the North Platte upon his first expedition. Truckee and Monitor Valleys and on the foot-hills and ridges of the East Humboldt Mountains, Nevada; 4–800 feet altitude; July, August. (973.)

Chenopodium hybridum, L. Foot-hills of the East Humboldt Mountains, Nevada, and in the cañons of the Wahsatch; 6–7,000 feet altitude;

[1] The plants of this Order in the collection were mostly examined and the new species named or indicated by Dr. Torrey, but he is not responsible for the descriptions, nor in some cases for the determinations.

June–August. Certainly indigenous, and apparently not differing from the European plant. Reported from the Saskatchewan, Colorado, and Indian Territory. (974.)

CHENOPODIUM BOTRYS, L. Salt Lake Valley. Introduced. (975.)

BLITUM CAPITATUM, L. From Western New York and Canada to the Saskatchewan, Great Slave Lake, and Youkon River, and southward in Colorado and New Mexico. East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–7,000 feet altitude; May–August. Growing in shaded places; 1–2° high. (976.) A reduced form was also collected with the stems decumbent or nearly so, and the leaves entire, often not even hastate. (977.)

BLITUM POLYMORPHUM, C. A. Meyer. (*B. rubrum*, Reich. *DC. Prodr.* 13. 2. 83.) Annual, smooth, with an erect or decumbent angled branching stem, 1–1½° high; leaves deltoid, rhombic-oblong or hastately 3-lobed, acute or obtusish, unequally sinuate-dentate or rarely entire, rather thick and sometimes reddish; spikes simple or subcompound, leafy or leafless; calyx closed in fruit, ecarinate, herbaceous or subbaccate; seed with an obtuse margin, shining, purple; terminal flowers with a 5-parted calyx, 5 stamens, and the seed horizontal; the remainder with the calyx 2–3-parted and 1–2 stamens. Var. HUMILE, Moq. (*Chenopodium humile*, Hook.) Stem decumbent; leaves entire, fleshy, the lower ovate-spatulate, the upper oblong or linear; clusters axillary and solitary.—Agreeing closely with the description of Hooker's plant from the marshes of the Saskatchewan, though somewhat larger. Thousand Spring Valley, Nevada; 6,000 feet altitude; September. It has been collected at Klamath Lake in Northern California, and Shoalwater Bay, Washington Territory. (978.)

MONOLEPIS[1] CHENOPODIOIDES, Moq. *DC. Prodr.* 13. 2. 85. (*Blitum Nuttallianum*, R. & S.) Glabrous, or somewhat glaucous and farinose; stems ascending or decumbent, 3–12′ high, branched; leaves ½–2′ long, attenuate into the petiole and hastate at base, the lobes acute and entire or the middle one laciniate-toothed; flowers in rather dense clusters in the axils, often reddish, the sepals lance-elliptic, obtuse, sometimes abortive;

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[1] MONOLEPIS, SCHRAD. Flowers polygamous, bractless. Calyx of a single scale-like sepal, persistent, without appendages. Stamen 1, inserted upon the receptacle. Disk and staminodia none. Styles 2, filiform, somewhat united at base, stigmatic on the inner surface. Utricle strongly compressed naked, rather thick, subadherent to the vertical flattened seed. Testa crustaceous, fragile. Embryo annular, surrounding the copious farinaceous albumen; radicle inferior.—Annual herbs, with alternate petioled leaves and clustered axillary flowers. MOQUIN, in *DC. Prodr.*

seed rather acutely margined, minutely tuberculate and not shining, ½″ in diameter.—From the Saskatchewan to Colorado, New Mexico, and Arizona. Dry hillsides and alkaline flats from the Truckee River to Ruby Valley, Nevada; 4–6,000 feet altitude; May–August. (979.)

MONOLEPIS PUSILLA, Torr. Very slender, 2–6′ high, glabrous or subfarinose, erect, diffusely much branched from the base, often reddish; leaves remote, oblong or ovate, 1–4″ long and 1″ wide, obtuse and attenuate into a very short petiole; clusters 1–5-flowered, the often solitary seeds compressed, rather obtusely margined, tuberculate and not shining, dark or reddish, ¼″ in diameter; calyx and utricle usually evanescent.—Collected by Anderson near Carson City, and rather frequent in the alkaline valleys of Western Nevada; 4–5,000 feet altitude, May–July. (980.) *Monolepis spathulata*, Gray, from Mono Pass, California, is more decumbent, the spatulate leaves numerous along the simple elongated branches, clusters crowded, utricle very papulose-scabrous, seed less compressed, very smooth and shining.

OBIONE[1] CANESCENS, Moq. *DC. Prodr.* 13. 2. 112. Shrubby, 1–5° high, hoary-canescent and pulverulent, unarmed, branches usually erect and virgate; leaves sessile, oblong or linear-oblong, narrowed at base, obtuse or acutish, occasionally emarginate, entire, 1–2½′ long and 2–4″ wide, (sometimes smaller and ovate or obovate;) flowers diœcious, the staminate in dense clusters at the extremities of the branchlets, the pistillate clusters less crowded, axillary; fruit 2–3″ long, hoary-pubescent, sessile or short-pedicelled, wingless or winged by the more or less dilated margins of the variously toothed bracts.—From Dakota to Northern Texas, and westward to Nevada and Southern California. Frequent in the dry and alkaline valleys of Nevada and Utah; 4–6,000 feet altitude. Most of the specimens have nearly or quite wingless fruit. (981.) Others have the bracts considerably dilated, though still less than is frequently the case. (982.)

OBIONE CONFERTIFOLIA, Torr. *Frem. Rep.* 318. Shrubby, 1–2° high, rigidly and diffusely branched, spinose, scurfy or mealy-pubescent; leaves ovate or obovate, 3–6″ long, short-petioled, obtuse or retuse or sometimes acutish, entire, becoming rather thick and coriaceous; flowers diœcious, the

[1] OBIONE, GÆRTN. Pistillate flowers all without calyx and 2-bracted, the bracts more or less completely united and becoming hardened or corky; radicle superior; otherwise as in *Atriplex*.—Monœcious or diœcious herbs or under shrubs, with mostly alternate entire or sinuate-dentate leaves. MOQUIN, in *DC. Prodr.*

small clusters axillary along the leafy branches, sessile; bracts nearly orbicular, becoming 3–5″ in diameter, united and cuneate at the indurated compressed base, and dilated upward, obtuse, entire or rarely with a few lateral teeth, waxy farinaceous.—Abundant in the alkaline valleys of the Great Basin and extending southward into New Mexico, Arizona, and Northern Mexico; 4–6,000 feet altitude; April–October. *O. spinosa*, Moquin, collected by Nuttall, should be the same, judging from the description. (983.)

Obione hymenelytra, Torr. *Bot. Mex. Bound.* 182. *Pac. R. R. Rep.* 4. 129, *t.* 20. Stem shrubby, 2–3° high, much-branched, the branches unarmed, subterete, hoary; leaves subdeltoid-orbicular, or truncate or subcordate at base, 1–1½′ in diameter, coarsely and acutely sinuate-dentate, densely hoary-scurfy; flowers diœcious, the staminate in dense clusters collected into axillary and terminal paniculate spikes; bracts reniform-orbicular, membranous, very entire, united only at base, the disk naked; fruiting bracts over 4″ in breadth, reticulately veined, the short pedicel tumid and spongy.—Colorado Desert and on the Lower Gila; Southern Utah, (Palmer, 1870.)

Obione Torreyi. Shrubby, 2 3° high, much branched, the short divaricate rigid branchlets usually spinescent, scurfy-pulverulent; leaves deltoid-hastate, ½–1′ long, the smaller becoming ovate or oblong, entire, obtuse or acutish, mucronulate; flowers diœcious, in numerous small sessile clusters, the staminate crowded in spreading panicles terminating the branchlets, the pistillate more scattered along nearly simple branchlets, which are leafy only toward the base; bracts of the flowers minute, ovate, obtuse and entire, united at base, densely farinaceous; fruit unknown.—Near *O. acanthocarpa*, Torr., but apparently very distinct, though the specimens are only in flower. Very frequent in the dry valleys bordering the Truckee and Carson Rivers, where it was also collected by Dr. Torrey (463;) July, August. (984.)

Obione argentea, Moq. *DC. Prodr.* 13. 2. 115. Annual and herbaceous, 6–15′ high, branching from the base, the branches ascending, densely mealy-canescent, especially when young; leaves rather thick and fleshy, ½–2′ long, usually hastate or deltoid, sometimes rhomboidal or ovoid, attenuate into the short petiole, obtuse or acutish, entire or rarely sinuate-toothed; flowers monœcious, in sessile axillary clusters upon the leafy branches; staminate clusters small; bracts somewhat orbicular, united at

base, dilated and herbaceous above in fruit, becoming often 2–3″ in diameter, the margin deeply and acutely toothed and undulate, the sides strongly reticulated and frequently more or less crested.—From Dakota to New Mexico and westward to California. Found in dry alkaline valleys or on foot-hills from the Truckee Desert to Northeastern Nevada; 4–6,000 feet altitude; May–September; but only in flower. (985.)

OBIONE PHYLLOSTEGIA, Torr. Annual and herbaceous, about 1° high, erect, the branches ascending; stem and leaves nearly glabrous or somewhat scurfy; leaves about 1′ long, deltoid-hastate or ovate-rhomboid, acute or acuminate, abruptly attenuate into a slender petiole equaling the blade; flowers monœcious or wholly pistillate, the staminate in large and conspicuous axillary clusters; bracts of the young fruit united into a somewhat tubular base, hairy below, the limb above lanceolate, acuminate, entire or gash-toothed; style elongated, nearly equaling the bracts.—Near to *O. argentea*, but a well-marked species, though the mature fruit is still wanting. As a slight doubt remains respecting the position of the radicle, it may yet prove to be an *Atriplex*. First found by H. Engelmann at "Gate of Gibraltar," Utah; not rare on dry foot-hills and near hot springs, between the Truckee and Humboldt Rivers, Western Nevada, growing with the last; 4,000 feet altitude; May. (986.)

OBIONE TRUNCATA, Torr. Annual and herbaceous, erect, branched, 2–3° high, slightly pulverulent and glaucous, furfuraceous above; lower leaves on short petioles, broadly ovate, truncate or cordate at base, obtuse or acutish, 1–2″ long, the upper ones sessile and cordate, acute, gradually diminishing to the ends of the branchlets; staminate clusters small and inconspicuous; fruit 1″ in diameter, the bracts broadly obovate, united to near the summit, which is truncate and denticulate, but slightly extended beyond the naked disk.—Collected by Dr. Anderson (40) near Carson City, and common on the Truckee River; 4–4,500 feet altitude; July. (987.)

OBIONE PUSILLA, Torr. Annual, herbaceous, 2–4′ high, diffusely branched from the base, white-scurfy throughout; leaves small, 1–2″ in diameter, sessile and subamplexicaul, ovate, acute, crowded above; flowers monœcious, minute; fruiting bracts ½″ long, ovate, acutish, entire, united half their length.—Near *O. microcarpa*, Benth. First collected by Anderson (65) near Carson City. Found on the edge of a dried alkali flat near the head of Humboldt Valley; 5,500 feet altitude; September. (988.)

GRAYIA[1] POLYGALOIDES, H. & A. (*G. spinosa*, Moq. *DC. Prodr.* 13. 2. 119.) Erect, diffusely branched, 1–3° high, the branchlets frequently spiny at the apex; leaves spatulate or obovate, 6–15″ long, 2–5″ broad, attenuate at base into a short petiole, somewhat farinaceous or scurfy, and rather fleshy; flowering spikes ½–1′ long, the staminate flowers small, the fertile spikes elongating in fruit and the calyx becoming 3–6′, in diameter, white or purplish, strongly compressed; fruit minute, rarely ⅔″ broad, nearly central in the calyx.—From Southwestern Wyoming and Utah to Washington Territory and Oregon, Nevada, and Southeastern California. Frequent in alkaline valleys and on dry foot-hills throughout the Great Basin; 4–6,500 feet altitude; May-July. (989.)

EUROTIA[2] LANATA, Moq. *DC. Prodr.* 13. 2. 121. White-tomentose, 6 18′ high, woody below, the subherbaceous branches virgate and often simple; leaves numerous, alternate and fascicled, linear-lanceolate, 6–18″ long, 1–2″ wide, revolute upon the margins; flowers frequently diœcious; fruiting involucre 2–3″ long, penicillate with four dense tufts of long white hairs, (becoming brown in the herbarium, as also the tomentum;) seed minute, ⅓″ long.—Scarcely differing from narrow-leaved forms of the Asiatic *E. ceratoides*. From the Saskatchewan and Western Dakota to New Mexico, and westward to the Sierras. Frequent in the dry valleys and ridges of Nevada and Western Utah, retaining its foliage and fruit through winter, and valuable for its fattening qualities for stock. Beef thus fed, however, acquires a peculiar rather disagreeable flavor. Known both as "White Sage" and "Winter

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[1] GRAYIA, H. & A. Flowers diœcious, bractless, glomerate-spicate. Staminate flowers with a 5-parted unappendaged calyx, the five stamens inserted upon the receptacle, with linear-subulate filaments and elliptic anthers. Calyx of pistillate flowers rounded-saccate, strongly compressed, winged on the margins, emarginate at the contracted mouth. Ovary sessile, narrow-oblong. Style slender-subulate, jointed at base. Stigmas 2, filiform, exserted, hirsute. Fruit included in the enlarged membranous net-veined calyx, compressed, orbicular. Seed flattened, rounded, vertical, with a thin adherent pericarp. Albumen central, mealy. Embryo nearly annular; radicle inferior.—A somewhat spinescent undershrub, with alternate or fascicled entire and subsessile leaves, the flowers in axillary clusters, forming terminal spikes. MOQUIN, in *DC. Prodr.*

[2] EUROTIA, ADANS. Flowers monœcious or sometimes diœcious; the staminate flowers glomerate-spicate at the extremities of the leafy branches; the pistillate below them, axillary, sessile, solitary or clustered, 2-bracted; bracts at first free, becoming connate, enlarging and including the flower in a calyx-like tubular involucre, the free summits elongated and narrowed. Calyx of the staminate flowers 4-parted, the lobes equal, membranous. Stamens 4, inserted on a naked receptacle. Fertile flowers without calyx, staminodia, or nectariferous disk. Ovary ovoid. Styles 2, capillary, united only at the base, exserted, hirsute. Fruit utricular, membranous, villous, included in the exceedingly hirsute involucre. Seed vertical, compressed, obovate, with a simple membranous testa. Embryo nearly annular, surrounding the small mealy albumen, green; radicle inferior.—Low stellately pubescent undershrubs, with alternate short-petioled entire leaves. LEDEBOUR, in *Flor. Ross.*

Fat," and of repute as a remedy in intermittents. 4,500–7,000 feet altitude; May–September. (990.)

KOCHIA[1] PROSTRATA, Schrad. *DC. Prodr.* 13. 2. 132. Shrubby and branched at base, 6–18′ high, the branchlets herbaceous, erect or ascending, virgate and mostly simple, pubescent, leafy; leaves narrowly linear, 3–12″ long, ½ rarely 1″ wide, thick, acutish, villous-pubescent, ascending or erect; flowers mostly in threes or solitary, the central one perfect; wings of the fruiting calyx 1″ in diameter, cuneate-orbicular, obtuse, obsoletely crenulate, nerved; fruit and seed 1″ in diameter, the thick embryo nearly filling the exalbuminous seed.—465 Torrey from Western Nevada, and reported elsewhere only in Geyer's collection, though frequent on the foot-hills and in the alkaline valleys of Nevada and Western Utah; 4–5,000 feet altitude; May–September. (991.) The whole plant reddish, but not otherwise different. (992.)

CORISPERMUM HYSSOPIFOLIUM, L. From Lake Superior to the Saskatchewan and Red Rivers, and northward to the Arctic Ocean; Oregon and Washington Territory; Arizona and New Mexico. Carson Desert, Nevada, and Jordan Valley, Utah; 4–4,500 feet altitude; August. (993.)

SALICORNIA HERBACEA, L. Along the coast from Georgia to New England, and in salt marshes westward to the Saskatchewan and Utah. Mouth of Bear River and at a salt spring in the Wahsatch; 4,300–6,500 feet altitude. (994.)

HALOSTACHYS[2] OCCIDENTALIS. Shrubby, erect, branching, 2–5° high; branchlets alternate, spreading, herbaceous, deep-green, jointed; leaves alter-

[1] KOCHIA, ROTH. Flowers polygamous, perfect and pistillate intermixed, bractless, axillary, sessile, solitary or clustered, loosely or closely spicate along the branches. Calyx globose-pitcher-shaped, 5-cleft, herbaceous, the lobes becoming winged on the back with transverse membranous or herbaceous processes, which are often wanting or imperfect in the perfect flowers. Stamens 5, usually exserted, with filiform filaments and ovate anthers. Styles 2, elongated, filiform, divaricate. Fruit utricular, depressed, included in the hardened calyx. Seed horizontal, round-ovate, depressed, with a simple membranous testa. Embryo nearly annular, thick, green, surrounding the scanty albumen, (sometimes wanting;) radicle centrifugal.—Villous or pubescent herbs or undershrubs, with alternate sessile narrow or semi-terete and fleshy leaves. MOQUIN, in *DC. Prodr.*

[2] HALOSTACHYS, C. A. MEYER. Flowers 1–3, perfect, the clusters subtended by bract-like scales, alternate and crowded in amentaceous terminal spikes. Calyx urceolate, not immersed in the slender rachis, free, becoming rather spongy and laterally obcompressed. Stamens 1–2, the subulate-setaceous filament exserted. Ovary free, ovoid, the ovule suspended from a short funiculus. Styles short, subexsert, united to the middle. Fruit utricular, included in the calyx, compressed, the very thin membranous pericarp wholly free, finally bursting transversely at base. Seed vertical, rounded and subcompressed, with a brown membranous nearly smooth testa. Embryo semicircular, half surrounding on the upper side the rather fleshy albumen; radicle inferior.—Saline herbs or shrubs, glabrous, with fleshy leaves and branchlets, or leafless, jointed or jointless. LEDEBOUR, in *Fl. Ross.*

nate, very short and scale-like, broad and amplexicaul at base, acute, often nearly obsolete; spikes numerous, alternate, sessile or sometimes peduncled, cylindrical, 3–10″ long, 1″ or more in diameter; scales rhomboidal, obtuse, free at the top and sides; flowers in threes, a little exserted; seed very small, less than ¼″ in diameter.—About Great Salt Lake and in alkaline valleys westward to the sinks of the Carson and Humboldt Rivers, where it grows luxuriantly in large tracts that would be otherwise destitute of vegetation. It has been referred to *Salicornia fruticosa*, L., (*Arthrocnemum*, Moquin, in part,) but is widely different. Nor does it accord with any of the described species of *Halostachys*, though approaching *H. Ritteriana*, Moq., of Spain and Chili. Flowering in August; fruit still immature in October. (995.)

SUÆDA MARITIMA, Dumort. Along the seacoast from Florida to New England, and on alkaline plains from the Platte to Western Texas and westward; California, (Douglas.) Frequent in the alkaline valleys of Nevada and Utah, growing 1–2° high, erect and diffusely branched, glabrous or sometimes purberulent, deep-green or the whole plant purple; cauline leaves about 1′ long and less than 1″ in diameter; seed ½″ broad, shining, very minutely punctate-striate near the margins; flowering in July, fruiting in September. (996.)

SUÆDA DEPRESSA, Ledeb. (*Salsola*, Pursh, *Fl. Am.* 197. *Chenopodina*, Moq., *DC. Prodr.* 13. 2. 164.) Annual, herbaceous, prostrate, very much branched, glabrous, often reddish; stems (3–6″ long) and branches usually more or less flexuous; leaves mostly flatter and broader than in the last; flowers and seed similar.—Apparently distinct from *S. maritima*, but perhaps identical with *S. prostrata*, Pall., which is the older name. Moquin's description differs essentially from that of Pursh, though both were drawn from Nuttall's specimens. Reported from the Saskatchewan, Dakota, and Colorado. Alkaline flat near the head of Humboldt Valley, Nevada. (997.)

SUÆDA FRUTICOSA, Forsk. *DC. Prodr.* 13. 2. 156. Var. (?) Stout and shrubby at base, 2–3° high; stems suberect, branched, leafy, glabrous; cauline leaves 1–2′ long, ½–1″ in thickness, narrowed at base, scattered or rather crowded, those on the branchlets shorter, acute or obtuse; flowers 1–8 in the axils, fertile or staminate; calyx-lobes nearly 1″ long, obtuse and somewhat hooded, narrowly scarious on the margins; stamens exserted; seed black and shining.—This is 522 Frémont from the Sweetwater in Cen-

tral Wyoming, Stansbury's plant from near Salt Lake, and 466 Torrey from Nevada. Dr. Torrey has proposed for this the name of *S. Moquini*, (in *Pac. R. R. Rep.* 7. 18., *Bot. of Parke's Exped.*,) but it is not probable that Moquin had this plant in view in his description of *Chenopodina linearis*. He seems to have confounded the ordinary *S. maritima* of the Atlantic coast (*Salsola linearis*, Ell.) with specimens of *S. fruticosa* from Cuba, drawing from the latter the character "shrubby," and led by the other to conjecture a near identity with the herbaceous *S. prostrata*. The present plant is also probably the same as *S. fruticosa*, Var. (?) *multiflora*, Torr., (*Pac. R. R. Rep.* 4. 130,) found from Western Texas to Northern Arizona, and will with little doubt prove to be but one of the many forms of the Old World species. Collected near Humboldt Sink, Nevada, and on Stansbury Island in Salt Lake; May and June, in flower. (998.)

SCHOBERIA[1] OCCIDENTALIS. (*Salsola ?, n. sp.*, Torr., in Ms.) Stems 1° high, branched; cauline leaves 6–12″ long, ½″ thick, nearly terete, acute; flowers mostly solitary in the axils; lobes of the 5-cleft calyx obtuse, becoming transversely winged upon the back, the wings short, obtuse, veinless and partially united; the winged fruit 1″ in width, depressed; seed horizontal, ½″ wide, black and shining.—With much the habit of small specimens of *Suæda maritima*. The winged calyx would suggest an affinity to *Salsola*, but the double integument of the seed and the flat spiral of the embryo refer it rather to the present genus, which, as Ledebour remarks, is distinguished from *Suæda* more by artificial than natural characters. Dry alkaline meadow in Ruby Valley, Nevada; 6,000 feet altitude; September, in fruit. (999.)

SARCOBATUS[2] VERMICULATUS, Torr. (*Fremontia vermicularis*, Torr.

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[1] SCHOBERIA, C. A. MEYER. Flowers perfect, axillary along the branches, sessile, solitary or clustered, minutely bracted. Calyx rounded-urceolate, 5-cleft to the middle or subparted, the lobes fleshy, in most of the flowers with hooded or long-beaked processes upon the keel or at the base, or transversely compressed and winged. Stamens 5, on the receptacle, with linear filaments. Ovary adnate to the calyx by a broad base. Style obsolete, the two stigmas short and subulate. Fruit utricular, inclosed in the connivent calyx, the integument free, thin and fragile. Seed usually horizontal, lenticular, smooth or minutely punctate, with a double testa and small albumen; embryo spiral, flat, green, the radicle exterior.—Annual erect glabrous saline herbs, with alternate entire fleshy leaves. LEDEBOUR, *in Fl. Rossica;* including *Brezia* and *Calvelia* of Moquin.

[2] SARCOBATUS, NEES. Flowers unisexual, monœcious and diœcious. Staminate flowers in terminal aments. Scales eccentrically peltate, stipitate, angular, cuspidate. Stamens 2–4 under each scale, naked, sessile; anthers oblong. Pistillate flowers solitary, axillary. Calyx ovate, compressed, urceolate, contracted at the apex about the style and somewhat bifid, enlarged and thickened in fruit and developing below the middle a broad transverse undulate veined wing. Ovary sessile, very thin and membranous, flattened, orbicular, mostly oblique, terminating laterally and abruptly in the slender included persistent style; stigmas exserted, thick, divaricate, often unequal; ovule on a short funiculus, campy-

*Frem. Rep.* 95 and 317, *t.* 3.) Erect, 3–6° high, diffusely branched, more or less spinose and the rigid divaricate or spreading branchlets spinescent at the extremities; leaves 6–18″ long and 1–2″ wide, frequently much smaller and fascicled on the branchlets, scurfy-puberulent when young, becoming glabrous; staminate aments 3–9″ long, cylindrical or oblong, nearly 2″ in diameter; anthers soon deciduous; winged calyx of the mature fruit 3–6″ broad; seed 1″ in diameter, with a thin membranous transparent testa.—From the Upper Platte and Missouri Rivers to New Mexico and the Gila River, and west to California and Oregon. Frequent in the alkaline valleys of Nevada and Utah, and sometimes found in the lower cañons of the mountains; 4–6,000 feet altitude; flowering from May to July, in fruit till October. (1,000.)

## AMARANTACEÆ.

AMARANTUS PANICULATUS, L. Collected at Unionville, Nevada; doubtless introduced. (1,001.)

AMARANTUS RETROFLEXUS, L. Reported from ravines and about marmot burrows in New Mexico. Found near roadsides, but far from cultivated fields, Malade Valley, Utah, and in cañons in the Wahsatch; probably indigenous. (1,002.)

AMARANTUS ALBUS, L. Reported from the Upper Missouri, Northern Texas, and Menzies Island in the Columbia River. Truckee River bottom, and roadsides in the low valleys of Nevada and Utah. Midvein of the leaf terminating as usual in a short awn; erect, the lower branches ascending; ½–2° high. (1,003.) With it was also found a wholly prostrate form, the stems 1–2° long; leaves obovate or nearly orbicular. (1,004.)

MENGEA[1] CALIFORNICA, Moq. *DC. Prodr.* 13. 2. 270. Erect, 1–1½° high, loosely branched; leaves obovate or ovate, 5–12″ long, attenuate into a petiole, very obtuse, mucronulate; clusters much shorter than the petioles,

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lotropous. Seed vertical, with a double integument; embryo flat-spiral, green; radicle inferior; albumen at the base, very small or none.—A spinescent shrub of alkaline soils, with alternate linear fleshy leaves.

Dr. GRAY suggests that the wing of the fruit may be the developed margin of the calyx, (as it was considered by Dr. Torrey,) and the superior portion an enlargement of a hypogynous disk. Dissection favors this view of its structure, though differing from the analogies of the order.

[1] MENGEA, SCHAUER. Flowers monœcious, 1-bracted. Calyx of a single lateral erect glabrous sepal. Stamens 1–2, with capillary filaments and 2-celled oblong-ovate anthers. Ovary 1-celled, 1-ovuled. Style very short; stigmas 2–3, filiform, divaricate. Fruit utricular, subovate, without valves, naked. Seed vertical, flattened-reniform, with crustaceous testa. Embryo annular, surrounding the mealy albumen; radicle inferior.—Diffusely branched glabrous herbs; leaves alternate; flowers in axillary sessile clusters, the staminate terminal and subsolitary; bracts scale-like, slightly carinate, persistent. MOQUIN, in *DC. Prodr.*

rather dense, greenish; bracts leafy, lanceolate, acute; sepal narrow-lanceolate, white-membranous; utricle slightly rough, marked by three elevated longitudinal lines, acutish, green or purplish; seed ⅓′′ long, compressed, obscurely punctate, dark and shining.—California, (1930 Hartweg.) Near Carson and Empire Cities, Nevada, (90 Anderson and 457 Torrey.)

NITROPHILA[1] OCCIDENTALIS. (*Banalia*, Moq. *DC. Prodr.* 13. 2. 279.) Glabrous; stems herbaceous from a perennial running root-stock, ascending or decumbent, 3–8′ long, diffusely branched, angular, jointed; lowermost leaves broadly ovate or oblong, amplexicaul, 2–3′′ long, the remainder linear, 6–12′′ long, semi-terete, acuminate-mucronate; bracts shorter but similar, mostly twice longer than the flowers; flowers 1–3 in each axil, the lateral ones frequently short-pedicelled, 2–3-bracted, the central one sessile and often bractless; sepals 1′′ long, white and petaloid, erect, exceeding the stamens and style; branches of the persistent style divergent; utricle globose, brown; seed ½′′ in diameter, black and shining, the margin obtuse.—Collected by Nuttall in Oregon, by Wilkes on the Lower Sacramento, by Cooper in the Providence Mountains, Southern California, and by Stretch in Southwestern Nevada. Near hot springs and in alkaline soils in the valleys of Western Nevada; June, in flower; September, in fruit. (1,005.)

ALTERNANTHERA[2] LANUGINOSA, Torr. *Bot. Mex. Bound.* 180. (*A. lanuginosa*, Moq., *DC. Prodr.* 13. 2. 359, in part.) Annual, prostrate, diffuse, densely woolly when young with verticillate branched white hairs, becoming nearly smooth; stems 1° long, not jointed; leaves somewhat in threes, entire, thick, obovate, rounded or rhomboidal, 3–10′′ long, exceeding the peti-

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[1] NITROPHILA. (*Banalia* § *Idiopsis*, Moq.) Flowers perfect, mostly 2-bracteate, 1–3 in each axil, sessile or short-pedicelled. Sepals 5, (rarely 6 or 7,) distinct, oblong, carinate-concave, pointless, persistent. Petals and staminodia none. Stamens as many as the sepals, united at base into a very short perigynous disk; anthers 2-celled, short-oblong, deeply cordate at base. Styles united to the middle. Ovary 1-ovuled. Utricle included within the connivent sepals, indehiscent, 1-seeded. Seed vertical, pendulous from a slender erect funiculus, lenticular; testa crustaceous. Embryo annular, slender, nearly surrounding the copious mealy albumen; radicle inferior.—A low perennial branching saline herb, with fleshy opposite estipulate mostly semi-terete leaves, and axillary flowers.

The single species upon which this genus is founded was referred by Moquin doubtingly to his *Banalia*, the two other species of which (from India and Brazil) are annuals with flat dilated alternate leaves, the 3-bracted clustered flowers in panicles or spikes, the stamens united at base into a cup, the stems jointless. It is much like a *Scleranthus* in habit, and seems to be most nearly allied to *Polycnemum*.

[2] ALTERNANTHERA, MART. Flowers perfect or rarely diœcious, 3-bracted. Sepals 5. Stamens 5, connate at base into a short cup; filaments filiform; the intermediate staminodia very minute and usually entire; anthers 1-celled. Ovary 1-celled, 1-ovuled. Style short; stigma capitate or 2-lobed. Utricle ovate. Seed vertical, sublenticular; the testa subcrustaceous. Embryo annular, peripherical; radicle superior.—Herbs or rarely shrubs, often jointed, usually finely villous; leaves opposite: flowers usually in terminal or axillary heads, at length deciduous. Two species occur in Florida.

ole, very obtuse or sometimes acutish, mostly acute at base; flowers perfect, mostly in pairs, axillary or terminal on short branches, sessile; sepals nearly 1″ long, rigid, lanceolate, obtusish, pubescent at the apex, four times longer than the bracts; the united base of the stamens as long as the ovary; staminodia very small or wanting; stigma capitate; utricle twice longer than the calyx, subcompressed, glabrous.—New Mexico, Arizona, Sonora; Southern Utah, (Palmer, 1870.)

## PARONYCHIEÆ.

Paronychia pulvinata, Gray. *Proc. Acad. Phil.*, Mar. 1863, *p.* 58. Matted-cæspitose from a woody root, nearly glabrous; stipules silvery, broadly ovate, entire, pointless; leaves thick, oblong, obtuse, ciliolate-scabrous upon the margin and somewhat minutely glandular-pubescent, equaling the stipules and with them densely covering the short stems; flower solitary, terminal, sessile; sepals oval, broadly scarious, awned a little below the somewhat arched apex.—Alpine, forming dense cushion-like tufts, occasionally sending out short nearly naked pubescent stems; stipules 2″ long, the uppermost somewhat acute but blunt; leaves 2½–3″ long and 1″ wide, bright-green and nerveless; flowers immersed among the leaves; staminodia 5, similar to the fertile filaments; ovary glabrous, tapering into the rather short style. Rocky Mountains of Colorado. Uinta Mountains, Utah, above the head of Bear River; 12,000 feet altitude; August. (1,006.)

## POLYGONACEÆ.[1]

Eriogonum[2] cæspitosum, Nutt. *T. & G., l. c., p.* 157. (§ Umbellata. See Appendix, under *Eriogoneæ.*) Matted-cæspitose; leaves 3–6″ long, mostly rosulate on the prostrate branches of the caudex, spatulate, hoary-tomentose on both sides, the margins more or less revolute; scape leafless, 1–3′ high; involucre solitary, naked, deeply 6–8-cleft, the lobes narrow, spreading and at length reflexed; calyx 2–3″ long, yellow or tinged with purple, slightly silky-villous, shortly contracted at base, segments oval, the

[1] We are indebted to Dr. Asa Gray for the determinations in the Suborder *Eriogoneæ*, as well as for the specific descriptions, which are drawn from the recent "Revision of the Eriogoneæ," by Drs. Torrey and Gray, in the Proceedings of the American Academy, Vol. VIII, pp. 145–200.

[2] ERIOGONUM, Michx. Involucre many-flowered, (seldom few-, very rarely 1-flowered,) campanulate, top-shaped, or cylindric, usually 5–8-toothed or lobed, pointless. Flowers jointed upon their pedicels, which are more or less exserted from the involucre in flower; bractlets usually very delicate or very narrow. Calyx 6-parted or deeply 6-cleft. Stamens 9. Achenium triangular, or in a few species 3-winged.—North American herbs or undershrubs, mostly west of the Mississippi. T. & G., *l. c.*

inner and the filaments more or less villous at base; ovary sparingly hirsute above.—From Washington Territory to south-eastern Wyoming. On the Trinity Mountains and above Roberts Station, Nevada; 6,000 feet altitude; May–July. (1,007.)

Var. (*E. Andinum*, Nutt.) A reduced form with smaller bright-yellow flowers and glabrous achenium. In the Virginia and Pah-Ute Mountains, and Ruby Valley, Nevada; April–September. (1,008.)

ERIOGONUM SPHÆROCEPHALUM, Dougl. *T. & G., l c., p.* 157. Hoary-tomentose; stems ascending or erect, from a shrubby base, branching, leafy; leaves spatulate or narrow-oblong, narrowed at base, whorled and fascicled, or few and alternate, upper surface at times glabrate; peduncles short, usually solitary, sometimes subumbeled or dichotomous; involucres naked, deeply 6–8-cleft, the lobes narrow, spreading, finally deflexed; calyx yellow, the stipe-like base about equaling the pedicel, segments oblong-ovate or the inner ones spatulate; filaments villous at base.—Very variable. California to Washington Territory and Montana. Form (5) of T. & G. is the only one collected; leaves 6–9″ long, hoary with a fine closely appressed tomentum; stems more simple and much less leafy; calyx finely pubescent. Low (6–8′,) with bright-yellow flowers; found growing in broad patches on the foot-hills of Regan's Valley, Nevada; 5,000 feet altitude; June. (1,009.)

ERIOGONUM HERACLEOIDES, Nutt. *T. & G., l. c., p.* 159. Rather slender, woolly, tomentose or webbed; sterile branches decumbent, subcæspitose, fasciculate, leafy at top; flowering branches or scape-like peduncles sometimes naked, most usually with a whorl of leaves in the middle, with a simple or compound umbel, for the most part involucrate-bracted; leaves spatulate-oblong or oblanceolate, white-woolly beneath or on both sides; involucre 6–8-cleft, the lobes spreading and soon reflexed, with numerous flowers; segments of the pale-yellow very glabrous calyx scarcely longer than the very slender stipe; filaments villous below; ovary more or less finely hirsute toward the top, especially upon the angles; cotyledons orbicular, equaling the incurved radicle.—The typical form is 1½–2° high; leaves becoming glabrate above; umbel compound, many-rayed; flowers pale, smaller than in *E. umbellatum*, the stipe proportionally longer. Washington Territory to Nevada. East Humboldt Mountains, Nevada, and in the Wahsatch, frequent; 6–9,000 feet altitude; June–August. (1,010.)

Var. MINUS, Benth. Rather smaller, sometimes with leaves only sub-

tending the umbel; passing into Var. ANGUSTIFOLIUM, T. & G., with sublinear leaves and a simple or compound umbel. East Humboldt Mountains, Nevada; 7–10,000 feet altitude; July, August. (1,011)

ERIOGONUM UMBELLATUM, Torr. *T. & G., l. c., p.* 160. A span to a foot high, woolly, tomentose or webby; sterile branches decumbent or creeping, often stolon-like, loosely cæspitose, fasciculate-leafy at top; leaves obovate-spatulate and oval, narrowing to a petiole, white-woolly beneath; peduncles scapelike, leafless excepting the involucre of bract-like leaves subtending the simple or rarely subcompound umbel; involucre deeply 6–8-cleft, many-flowered; calyx very glabrous, yellow or sometimes white, the segments 2–3-times longer than the slender stipe; filaments and ovary as in the last; cotyledons nearly orbicular, a little shorter than the scarcely incurved radicle.—Nebraska to Northern Texas and west to Oregon and California. Frequent in the mountains throughout Nevada and Utah; 6–10,000 feet altitude; June–September. (1,012.) A form is not rare with green and glabrate or almost glabrous leaves and peduncles. East and West Humboldt Mountains, Nevada; 7–9,000 feet altitude. (1,013.)

Var. MONOCEPHALUM, T. & G. Dwarf, depressed, cæspitose; leaves glabrate above or on both sides, the blade ¼–½′ long; scape ½–3′ high, slender, bearing 2–4 capitate involucres with usually 1–3 bracts, or a single larger one, usually naked; flowers smaller.—Oregon and California. On peaks of the East Humboldt and Clover Mountains, Nevada, and in the Uintas; 9–11,000 feet altitude; August, September. (1,014.)

ERIOGONUM (PSEUDO-UMBELLATA) LOBBII, T. & G.; *l. c., p.* 162. Perennial, low, cæspitose, hoary at first with a very soft webby tomentum; leaves crowded upon the thick caudex, subrounded, 1–2′ long, contracted abruptly into a usually longer petiole, rather thick, sometimes glabrate above; scape a span high, with rarely a single leaf below; umbel subcompound, dense, stipitate, the verticillate leafy bracts obovate or lanceolate; involucres campanulate, ½′ long, 5–7-cleft; flower with a very short abruptly contracted base; calyx 3″ long, very glabrous, 6-parted, white or dull-yellow, the segments ovate, nearly equal; filaments villous below; ovary very glabrous; radicle subinflexed, a little exceeding the rounded-obovate eccentric cotyledons.—In the Sierras; 8–11,000 feet altitude; near Virginia City, Nevada, (Stretch;) 6,500 feet altitude.

ERIOGONUM (LACHNOGYNA) ACAULE, Nutt. *T. & G., l. c., p.* 163.

Perennial, matted-cæspitose, white-tomentose; leaves sessile, densely crowded upon the closely branched caudex, oblong or sublinear, margins revolute; head of 1–5 nearly sessile short 3–5-toothed involucres, sessile among the uppermost leaves, sometimes shortly exsert-pedunculate in fruit; flower with a broad sessile base, the calyx hardly 2″ long, tomentose, 6-parted, with equal oblong segments; filaments pilose only at base; ovary very tomentose with long tangled wool.—Leaves 2–3″ long, spreading from the imbricated sheathing base. Discovered by Nuttall in the Rocky Mountains of Colorado. Sandy foot-hills near head of Holmes Creek, Northeastern Nevada; 6,000 feet altitude; September. (1,015.)

ERIOGONUM (HETEROSEPALA) OVALIFOLIUM, Nutt. *T. & G., l. c., p.* 164. Perennial, cæspitose, acaulescent, hoary-woolly; leaves oval or somewhat rounded, petioled, crowded upon the numerous short branches of the caudex; scape 3–9′ high, simple, leafless, with a single head (very rarely 2) of few (3–8) closely sessile 5–8-toothed involucres; bracts very small or wanting; calyx with the base not produced, very glabrous, 6-parted, more or less yellow or rose-colored, wholly petaloid, becoming thin and scarious after flowering; segments very unequal, the outer very broadly oval, cordate at base with usually a rather deep sinus, the lobes reaching to the joint or beyond it, the inner narrow, spatulate, emarginate, connivent-erect and involute, each bearing 3 stamens at the claw-like base; ovary glabrous; embryo incurved, the ascending radicle much exceeding the orbicular accumbent cotyledons.—From Colorado to the borders of California; Southern Utah, (Palmer.) The present specimens have the flowers dull-white, usually veined with purple and somewhat tinged with yellow. Frequent on the foot-hills from the Washoe Mountains, Nevada, to the Wahsatch; 5–6,000 feet altitude; May, June. (1,016.) Also collected in a reduced form on the East Humboldt Mountains, Nevada, at a height of 10,000 feet; July, August. (1,017.)

Var. Leaves oblong, long-petioled; flowers bright-yellow.—East foot-hills of the Pah-Ute Range, Nevada; June. (1,018.)

Var. TENUIUS, Benth. A slender form with smaller flowers. Dry foot-hills, head of Holmes Creek, Nevada; September. (1,019.)

ERIOGONUM (CAPITATA) KINGII, T. & G.; *l. c., p.* 165. Perennial, low, cæspitose-acaulescent, white-woolly; leaves crowded upon the many-branched caudex, spatulate, obovate, sometimes rounded, (blade 3–5″ long,) long- or short-petioled; scape slender, with a single usually naked globose head;

involucres sessile, 6–9, turbinate-campanulate, rather deeply 6–7-toothed, thinly membranous; bractlets slightly bearded; flowers with a broad or rather shortly narrowed base, not produced; calyx 1½″ long, glabrous, dull-yellow or rose-purple, the nearly equal segments obovate-subcuneate, emarginate; filaments nearly glabrous; embryo as in the last.—Peaks and high divides of the East and West Humboldt and Clover Mountains, Nevada; 8–11,000 feet altitude; July–September. (1,020.)

Var. LAXIFOLIUM, T. & G. Taller, scape 4′ high, branches of the caudex more slender; leaves fewer, sublanceolate, acute, sometimes 1′ long, on slender petioles; flowers golden-yellow.—A strongly marked form, found on a rocky ridge of Stansbury Island, and in the Wahsatch, above Parley's Park; 5–9,000 feet altitude; June, July. (1,021.)

ERIOGONUM (CAPITELLATA) ELATUM, Dougl. *T. & G., l. c., p.* 168. Perennial; leaves all radical, very softly villous-pubescent or almost velvety beneath, ovate-oblong or sublanceolate, narrowed into a petiole, rarely subcordate or subhastate at base, margins usually undulate; scapes 1–3° high, naked, rigid, rush-like, sometimes inflated; involucres glabrate or glabrous, few, cylindric or turbinate-campanulate, repandly 5-toothed, many-flowered, gathered in heads or clusters upon a rigid panicle, sometimes only in pairs or solitary in the forks and on rather longer pedicels; bractlets plumose; base of the flower not produced; calyx white or rose-colored, 6-parted, a little hairy at base, the segments ovate-oblong, nearly equal; ovary glabrous; embryo incurved; cotyledons broad and short.—From Washington Territory to California and Nevada. On the Virginia and West Humboldt Mountains, Nevada; 7,000 feet altitude; August, September. (1,022.)

ERIOGONUM (FASCICULATA) FASCICULATUM, Benth. *T. & G., l. c., p.* 169. Shrubby, glabrous or subtomentose, the branches with numerous fascicled leaves; leaves small, oblong-linear or linear-spatulate, margins very revolute, the larger ones attenuate to a short petiole; involucres many-flowered, crowded in capitate usually 3–6-rayed cymes terminating the naked slender peduncles, truncate, subdentate, the teeth at first membranously united; calyx not produced at base, white or pinkish, the obovate-oblong segments nearly equal; bractlets plumose; ovary glabrous; radicle accumbent-incurved upon the rounded half-shorter cotyledons.—Southern California. Var. POLIFOLIUM, Gray. Hoary throughout with a fine pubescence, the leaves sometimes glabrate above; peduncles usually longer, 3–5′; involucre-teeth not

projecting beyond the scarious sinuses; calyx pubescent.—Southern California and Arizona; Southern Utah, (Palmer.)

ERIOGONUM CORYMBOSUM, Benth. *T. & G.*, *l. c.*, *p.* 170. (§ CORYMBOSA. See Appendix, under *Eriogoneæ.*) Shrubby, 1½–2° high, floccose-woolly, the stout woody branches erect or assurgent, leafy to the top, terminated by a broad full-flowered cyme upon a short or rather long peduncle; leaves oblong, subundulate, 8–18″ long; flowers white, 1½″ long, usually rather thick at base after flowering, glabrous within, segments obovate, inner ones at least emarginate or retuse; ovary often scabrous above upon the angles. Utah (Frémont and Gunnison) and New Mexico.

ERIOGONUM MICROTHECUM, Nutt. *T. & G.*, *l. c.*, *p.* 170. Shrubby, rather low, (rarely 1° high,) very much branched from the base; tomentum floccose, sometimes rather thin; branches as in the last, but the cyme either crowded or effuse; leaves narrowly oblong and linear; flowers white or rose-colored, rarely dull-yellow, seldom over 1″ in length, usually rather thick at base after flowering, glabrous within, the segments and ovary as in the last.—In various forms from Nebraska to New Mexico and west to Northern California and Washington Territory. The typical form is low, with linear or linear-oblong, (occasionally oblong,) nearly flat leaves, and open corymbose cymes on rather long peduncles; involucres 1–1½″ long; uniformly rather slender and graceful in habit. Frequent in the mountains from the Sierras to the Wahsatch, especially in Nevada, with the blade of the leaves 6–12″ long and 2–3″ wide, peduncles 2–4′ long, and elongated leafy stems; 5–9,000 feet altitude; July–September. (1,023.)

A dwarf alpine form with the leafy stems but 1′ long, peduncles ½–2′ in length and small whitish or deep rose-colored cymes, was found on the East Humboldt Mountains, at 10,000 feet altitude; August. (1,024.)

Rather imperfect specimens were collected at the base of the Pah-Ute range, Nevada, at an unusually low elevation, more densely tomentose, the stems and peduncles rather stout and strict and the branchlets of the loose spreading cyme short and stiff; flowers pale-yellow, few in the involucres. (1,025.)

Specimens from the Wahsatch at 6,000 feet altitude, with very short (¾′) leafy stems and slender almost scapelike peduncles, (4′ long,) bright-yellow flowers and rather oblong leaves, are intermediate between the typical form and the following variety. (1,026.)

Var. FENDLERIANUM, Benth. Larger; leaves broad, 1–1½′ long and 4–5″ wide; involucres 2″ long in a broad loose cyme.—Collected in New Mexico by Fendler. Nevada specimens, from Bloomer and Torrey, connect with the following form.

Var. CONFERTIFLORUM, T. & G. Shrubby (1° high) and leafy; leaves narrowly oblong; flowers crowded in the usually contracted cymes.—From Utah (Stansbury) to Oregon and Northern California.

Var. LEPTOPHYLLUM, T. & G. Leafy; leaves narrowly linear with the margins strongly revolute, glabrate; cyme short, usually full-flowered and crowded.—Utah (Gunnison) and New Mexico.

Var. LEPTOCLADON, T. & G. More slender; leaves linear; cyme loosely panicled; involucres sometimes unilateral from the abortion of the second branchlet.—Green River, Utah, (Gunnison.)

ERIOGONUM BREVICAULE, Nutt. *T. & G., l.c., p.* 172. Cæspitose-shrubby, the woody leafy branches very short or depressed, bearing a naked elongated herbaceous scapelike peduncle; leaves 1–2½′ long and 1–5″ broad, linear, oblong-linear or narrowly spatulate-oblanceolate, attenuate into a slender petiole, white-woolly on both sides or becoming glabrous above, the margins at length mostly revolute; scapes rigid, 3–10′ high, the cyme repeatedly umbeled or trichotomous, calyculately bracted at the nodes; peduncles and the 5-toothed oblong or cyathiform-campanulate involucres (1½–2″ long) glabrous or soon glabrate; calyx glabrous within, white or rose-color or sometimes bright yellow, the segments obovate-oblong and nearly equal; ovary as in the preceding.—Cyme ample, either fastigiate or very open, the bracts short, connate, and white-woolly within. Approaching some forms of the last. From the head-waters of the Platte to New Mexico, Utah and Montana; Southern Utah, (Palmer.) Only in the Wahsatch; 5–7,000 feet altitude; June, July. Flowers mostly bright yellow; the leafy stems only 1–3′ but the slender peduncles 6–12′ long; the branching woody caudex often very stout. (1,027.)

ERIOGONUM RACEMOSUM, Nutt. *T. & G., l. c., p.* 175. (§ VIRGATA. See Appendix, under *Eriogoneæ.*) Perennial, floccose-woolly; scapes solitary or few from the summit of the subterranean caudex, stout, 1–3° high, naked or leafy-bracted at the lower nodes; leaves 1–3′ long, on long (3–4′) petioles, ovate or oblong, sometimes subcordate, white-woolly beneath; involucres tubular-campanulate, obtusely 5-toothed, many-flowered, numerous, appressed

and strictly spicate along the few rigid subsimple branches; calyx rather large, (2″ long,) pinkish or white, acute at base, very glabrous, with similar obovate segments; ovary glabrous or rough above; cotyledons orbicular, very eccentric, rather shorter than the incurved radicle.—Northern New Mexico and Utah. Foot-hills of the Wahsatch; 5–6,000 feet altitude; July. (1,028.)

ERIOGONUM WRIGHTII, Torr. *T. & G., l. c., p.* 176. Perennial, caulescent (1–2° high) from a woody base, branched; branches leafy below; leaves ½–1′ long, oblong-ovate or sublanceolate, narrowed at base, white-woolly both sides or only beneath, smaller and often fascicled in the axils; panicle dichotomously branched; involucres 1–1½″ long, with small bracts, rather loosely spicate along the somewhat rigid branches, 5–6-toothed, many-flowered; calyx white or pinkish, very glabrous, acute at base, segments broad-obovate or the outer ones suborbicular; ovary scabrous above, especially on the angles.—A polymorphous species, extending from Southwestern Texas to Arizona, Western Nevada and California. The Nevada specimens (collected by Anderson and others) belong to a depauperate form with very short leafy branches and more scapelike peduncles.

ERIOGONUM VIMINEUM, Dougl. *T. & G., l. c., p.* 177. Annual, low, (4–12′,) sparingly tomentose above or glabrous; leaves radical, rounded, white-woolly beneath, webby above; involucres narrowly tubular, not over 2″ long, very shortly 5-toothed, few-flowered, glabrous, appressed, scattered along the very slender glabrous branches of the loose and spreading decompound panicle; bractlets small, appressed, scarcely barbellate; calyx very glabrous, white or pinkish, shorter than the involucres even in fruit, outer segments broadly obovate, the inner narrower.—Washington Territory to California and Nevada. Virginia Mountains, Nevada; 6,000 feet altitude; August. Leaves 6–8″ in diameter, on ½–1′ petioles. (1,029.)

ERIOGONUM GRACILE, Benth. *T. & G., l. c., p.* 178. Annual, usually very much branched; leaves radical or sometimes more or less cauline, ovate or oblong, white-woolly beneath and floccose above, as also usually the branches and involucres; involucres few- or somewhat many-flowered, 5-toothed, about 1″ long, scattered on the slender branches of the spreading panicle, appressed; bractlets short, finely subglandular-barbellate; calyx glabrous, white or rose-colored, shorter than the involucre after flowering, outer segments obovate, the inner narrower. Var. EFFUSUM, T. & G. Pani-

cle decompound, very open, 4–12′ high; involucres usually glabrate; leaves all radical.—Involucres and flowers rather large for the species. Southern California and Nevada. Pah-Ute and East Humboldt Mountains; 5–6,000 feet altitude; July–September. (1,030.) Specimens from Truckee Desert are taller (18′) and branched from the base, but with very small flowers, the involucre but ½″ long, and the yellow calyx even smaller, the mature achenium exceeding the flower, the long beak minutely scabrous as in the ordinary form. (1,031.)

ERIOGONUM HEERMANNI, Dur. & Hilg. *T. & G.*, *l. c.*, *p.* 179. Annual, very glabrous or perhaps glabrate, dichotomously very much branched; involucres few along the short divaricate branchlets, short-campanulate, 1″ long and as wide, several-flowered, 2–3 times longer than the ovate-subulate bracts, teeth 4–5, broad, rounded; bractlets chaffy, glandular-ciliate, the outer linear, the innermost filiform; calyx glabrous, 2″ long in fruit, outer segments rounded, much larger than the oblong-spatulate inner ones; beak of the achenium minutely scabrous.—California, (Heerman;) sterile plains of Western Nevada, (Torrey;) Southern Utah, (Palmer.) The latter specimens are 6′ high, the branchlets rather stout and rigid, woolly tomentose; lobes of the involucre also pubescent; calyx white, very small.

ERIOGONUM PLUMATELLA, Dur. & Hilg. *T. & G.*, *l. c.*, *p.* 179. Annual, floccose-woolly, low, (3–8′;) leaves radical, orbicular, long-petioled, white-woolly beneath; branches of the decompound panicle rather rigid, many-flowered, either straight or twisted, at length becoming entangled; involucres very small, shorter than the flowers, campanulate, few-flowered, not exceeding the bracts, appressed, scattered on the naked branchlets; bractlets filiform, scarcely barbellate; calyx white, rose-purple or yellowish, glabrous, 1″ long, the similar segments (the inner ones slightly narrower, scarcely longer,) obovate-cuneiform and broadly retuse, quasi-pandurate from the incurving of the margins at the middle; achenium minutely scabrous above; embryo much incurved, the cotyledons accumbent.—Southern California, (Heermann;) Western Nevada. Carson Desert, West Humboldt Mountains, and Monitor Valley; 4–5,000 feet altitude; June–September. (1,032.)

ERIOGONUM DEFLEXUM, Torr. *T. & G.*, *l. c.*, *p.* 181. (§ PEDUNCULATA. See Appendix, under *Eriogoneæ*.) Annual, rather stout, 1–2° high; leaves 1–2′ in diameter, radical, rounded, subcordate, floccose-woolly, long-petioled; branches of the glabrous effuse many-flowered panicle rigid, rushlike, usually

divaricate; pedicels rigid, sometimes racemose-secund, soon deflexed, very short; involucre short-campanulate or hemispherical, about 1″ long, exceeding the pedicels, many-flowered; bractlets bearded-ciliate, the outer broad-linear, the inner filiform-spatulate; calyx white or yellow, glabrous, very obtuse at base, the outer segments orbicular, cordate at base, the inner obovate, retuse, many times smaller; beak of the achenium more or less scabrous.—With much the habit of the *Virgata* section, which it approaches. Southeastern California, Southern Arizona, and Southern Utah, (Palmer, 1870.) Virginia Mountains, Western Nevada, and in the Wahsatch at the mouth of American Fork Cañon; 5–6,000 feet altitude; August. (1,033.)

ERIOGONUM NUTANS, T. & G.; *l. c.*, *p.* 181. Annual, low (2–4′) and somewhat slender; leaves all radical, ½′ in diameter, round, floccose-woolly, on long or short petioles; panicle loose and spreading, rather simple, glabrous; pedicels nodding, 2–3″ long, very minutely viscous-glandular as well as the broadly campanulate rather few-flowered (1″ long) involucre; bractlets filiform, very thickly glandular; calyx bright rose-color, becoming 1–2″ long, very obtuse at base, outer segments broad-oval, emarginate and almost obcordate, the inner not half as large and a little shorter, oblong, retuse, at length folded; beak of the achenium more or less scabrous.—Mud Lake Valley, 20 miles north of Pyramid Lake, (Beckwith.) Unionville Valley and foot-hills of the Pah-Ute range, Nevada; 5,000 feet altitude; June. PLATE XXXIII. Fig. 1. A plant; natural size. Fig. 2. A node, with bracts, involucre and flowers. Fig. 3. A flower, expanded. Fig. 4. The nearly mature achenium; all enlarged four diameters. (1,034.)

ERIOGONUM WATSONII, T. & G.; *l. c.*, *p.* 182. Annual, slender, 6–12′ high; leaves as in the last, usually subcordate; panicle glabrous, decompound, very spreading and open, loosely many-flowered; pedicels glandless, spreading or deflexed, 2–3 times or sometimes but little longer than the narrow- or clavate-campanulate scarcely many-flowered smooth (1′ long) involucre; bractlets setaceous, sparingly glandular-barbellate; calyx very glabrous, white or pinkish, obtuse at base, the segments similar, oval, a little retuse, the inner ones slightly smaller; beak of the achenium more or less scabrous.—The very effuse panicle is broader than its height, the pedicels sometimes very minutely and obscurely glandular, the calyx 1″ long, narrower than in the last but less so at base than the following. First found by Dr. Torrey in the West

Humboldt Mountains, Nevada. Collected in Star Cañon of the same range; 5,000 feet altitude; September. (1,035.)

Eriogonum cernuum, Nutt. *T. & G., l. c., p.* 182. Annual, slender, 4–12′ high; leaves radical or sometimes cauline, round or obovate, somewhat long-petioled, floccose-woolly; panicle glabrous, widely spreading, decompound, usually very many-flowered; pedicels soon deflexed, smooth, 2–3 times longer than the campanulate glabrous many-flowered involucre; bractlets setaceous, short, subnaked; calyx white or pinkish, glabrous, 6-cleft, turbinate and acute at base, the outer segments square, emarginate or retuse, scarcely exceeding the oblong half-as-wide inner ones.—Involucres not over 1″ long; flowers scarcely as long and often much shorter, and well-marked by the top-shaped base. Western Texas to Arizona and north to Wyoming and Idaho. Var. tenue, T. & G. Panicle more slender, and with less numerous flowers; pedicels capillary, elongated, 3–12″ long; involucre smaller or more slender, few-flowered.—Ruby Valley and Humboldt Pass, Nevada, on the foot-hills of the Wahsatch and in Bear River Valley, near Evanston, Utah; 5–6,000 feet altitude; July–September. (1,036.)

Eriogonum pusillum, T. & G.; *l. c., p.* 184. Annual, often small, 2–10′ high; leaves radical, 2–12″ in diameter, round and obovate, usually narrowed into a petiole ½–1½′ long, the larger often subcordate at base, white-woolly beneath, floccose above; bracts rather small, in fours at the nodes and base of the loose somewhat simple or effusely branched panicle, glandular and woolly within; pedicels very slender and elongated, in the forks ½–1′ long, not deflexed; involucre nearly hemispherical, coarsely 5–6-toothed, 10–15-flowered, minutely glandular, less than 1″ long; bractlets obovate and spatulate, loosely webby-woolly below; calyx yellow, sometimes tinged with purple, becoming nearly 1″ long, slightly glandular-puberulent, very obtuse at base, deeply 5-parted, the segments nearly similar, the outer oval-obovate, a little larger than the oblong inner ones.—Foot-hills of the Trinity Mountains, Nevada; 5,000 feet altitude; May. (1,037.)

The original description, here slightly modified, was founded on a dwarf precocious form. Better developed specimens (ticketed by Dr. Gray *E. reniforme*) have larger subcordate leaves and a more branched panicle. The very nearly allied *E. reniforme*, Torr., collected by Frémont on the Sacramento, and by Cooper and Palmer in Western Arizona, first described in Frémont's report, has the leaves densely and very softly woolly on both sides

and somewhat reniform, the involucres not glandular, and the white or pinkish calyx glabrous. Specimens collected in Arizona by Dr. Palmer in 1870 are 1° high, very slender and delicate; the glabrous ovate achenium exceeding the calyx.

Eriogonum trichopodum, Torr. *T. & G.*, *l. c.*, *p.* 185. Leaves finely pubescent or glabrous above, oval or rounded, sometimes subcordate, long-petioled; scape short, sometimes very short, rather rigid, often fistulous and occasionally inflated; panicle divaricately much-branched, the branches elongated; bracts not woolly; pedicels capillary, divaricate and mostly secund along the ultimate branchlets; involucre ½″ long or usually less, glabrous, very few-flowered, 4–5-cleft; calyx yellow, densely pubescent, about twice longer than the involucre, the segments similar and nearly equal.—1–2° high; much resembling the next, but (as shown by Palmer's specimens) with more numerous and slender branches, the scapes and internodes shorter and less frequently inflated, the branches more simple and pedicels secund, the involucres fewer-flowered and the calyx and achenium smaller; the whole plant of a decided yellow hue. Western Texas to Southern California and collected by Dr. Palmer in Southern Utah.

Eriogonum inflatum, Torr. *T. & G.*, *l. c.*, *p.* 185. Annual, 1½–2° high; leaves radical, hirsutely or velvety-pubescent, sometimes glabrate, orbicular or rounded-cordate on elongated petioles; scape elongated, fusiform-inflated above; panicle effusely very much branched, (usually compoundly umbellate below, the primary rays sometimes inflated,) the branches rather rigid, naked and elongated between the joints; bracts ciliate, not woolly; pedicels capillary, divaricate, very glabrous, ½–1′ or more long, not deflexed; involucre about ½″ long, smooth, 4–5-cleft, few-flowered, the segments similar and subequal; calyx yellowish, densely hirsute, obtuse at base, segments ovate, subequal, becoming 1″ long.—California, Arizona, and Nevada. Foot-hills of the Trinity Mountains near the foot of Humboldt Lake; 4–4,500 feet altitude; May–August. As in other species, the younger specimens may be very much reduced, sometimes but 3–4′ high, with the panicle very simple, the scapes slender and not at all inflated and the leaves only 3–4″ in diameter. (1,038.)

Eriogonum (Pseudo-stipulata) angulosum, Benth. *T. & G.*, *l. c.*, *p.* 178. Annual, floccose-woolly, at length glabrate, 4–12′ high; stems erect, leafy, branching into a repeatedly di-trichotomous panicle; branches acutely

4–6-angled; radical leaves spatulate or rounded, the true cauline ones small, resembling dark-scarious stipules, the axillary leaves in pairs or fascicled, oblong-linear and lanceolate; pedicels filiform, ½–1′ long, widely spreading, involucres short-campanulate or hemispherical, minutely glandular or almost smooth, solitary, many-flowered, 5-toothed, (the teeth broad and short,) becoming dilated in fruit, but scarcely equaling the included bracts, which are thin, broadly spatulate, and woolly below; proper bractlets minute and capillary, villous-plumose, often wanting; flowers very obtuse at base, minutely glandular, scarcely 1″ long, on short pedicels not exceeding the bracts, rose-colored or white, deeply 5-parted, the outer segments ovate, concave, the inner at length longer, lanceolate-oblong; ovary glabrous; achenium sharply triangular.—California and Nevada; Southern Utah, (Palmer.) Rather frequent in the dry valleys and lower cañons of Western Nevada, as far east as Monitor Valley, and also found on Stansbury Island; 4–5,000 feet altitude; May–September. (1,039.)

*E. divaricatum*, and *E. salsuginosum*, Hook., reported as collected by Geyer and Nuttall, in "Utah," on the Upper Colorado, were probably found on the upper branches of Green River in Wyoming Territory.

ERIOGONUM (FOLIOSA) SPERGULINUM, Gray. *T. & G., l. c., p.* 189. Annual, hirsute at base, very slender, with elongated internodes, leafy; leaves hirsute and glandular, green on both sides, the cauline opposite or verticillate (the lowest only alternate) and fascicled in the axils, narrowly linear, the margins sometimes revolute; panicle loose and spreading, with smooth very slender capillary pedicels rarely 1′ long; involucres glabrous, very small, ½″ long, 4-cleft, 1-flowered with the rudiment of a second; bractlets none; calyx white, 1–1½″ long, with a slightly pilose very short base, petaloid, the segments equal, cuneate-oblong, the outer obtuse or retuse, the inner truncate at the apex and more or less erose-tridentate; ovary glabrous; achenium lenticular.—California, Western Nevada, (Anderson; Bloomer.)

OXYTHECA[1] DENDROIDEA, Nutt. *T. & G., l. c., p.* 190. Branches very numerous in a loose and spreading cyme; leaves only mucronate, the radical ones lanceolate or linear-lanceolate, slightly hirsute, the cauline leaves

[1] OXYTHECA, NUTT. Involucre few-flowered, cup-shaped, 4-cleft, the lobes terminated by slender awns. Flowers, bractlets, etc., as in *Eriogonum*. Achenium lenticular. Radicle long, accumbent to the orbicular cotyledons.—Divaricately many-branched annuals, loosely flowered, the slender branches sprinkled here and there with small pedicellate glands. T. & G., *l. c.*

gradually reduced in size, sometimes subconnate at base; involucre pedicelled, the awns often unequal; pedicels naked, at least the lower alar ones very slender. Var. (*O. foliosa*, Nutt.) A large stout and leafy form, 6′–1° high, rather sparingly branched, the conspicuous cauline leaves broad and connate at base; involucres about 1″ long, exceeding the awns; calyx white or pinkish, the outer segments pubescent, broad-oblong, obtuse, the inner more delicate, narrower and a little shorter; ovary glabrous, as in other species.—Southern Idaho, (Nuttall;) near Empire City, Nevada, (Dr. Torrey.) Monitor Valley, Nevada; 5,000 feet altitude; July. (1,040.)

Var. Very slender; branches very numerous and many-flowered; upper leaves small and inconspicuous; involucres very small, ½″ long or less, shorter than the awns; inner segments of the calyx emarginate.—Resembling the Chilian form. Pah-Ute Mountains and Monitor Valley, Nevada; 5,000 feet altitude; July–September. (1,041.)

OXYTHECA WATSONI, T. & G.; *l. c., p.* 191. Effusely much branched, 4–10′ high; radical leaves ½–1½′ long, oblong-spatulate, scarcely mucronate, pubescent; bracts ovate or ovate-lanceolate, mucronate with a long awn, usually connate but only at the base and mostly on one side, (where there is often an accessory awned lobe,) diminishing upward, rigid and usually decurved, the uppermost reduced ones and the lobes of the involucre half shorter than their rigid awns, (½–2″ long;) involucres about 3-flowered, subsessile in the axils, or terminating short bibracteolate pedicels.—The glandular pubescence is more dense above the nodes and sometimes stellate. Monitor Valley, Nevada; 5,500 feet altitude; July. PLATE XXXIII. Fig. 5. A small plant; natural size. Fig. 6. A node with bracts, involucre and flower; enlarged four diameters. Fig. 7. A flower, expanded; enlarged eight diameters. (1,042.)

OXYTHECA PERFOLIATA, T. & G.; *l. c., p.* 191. Closely resembling *Chorizanthe perfoliata*, low (3–6′,) divaricately branched, glandular-pubescent on the lower half of the internodes; leaves scabrous, becoming glaucous, red and chartaceous in older specimens, the radical ones spatulate, ciliate, the cauline or bracts ½–1′ in diameter, scarcely diminishing upward, (half the length of the internodes,) centrally perfoliate, excepting the lowest whorl of 3–4 small leaves, which are connate only at base, disk-shaped, subtriangular-orbicular, reticulately veined, 3-awned; involucres sessile in the axils, solitary, the lobes 1½″ long, subulate-lanceolate, equaling their awns, with 4–6 con-

spicuously pedicellate flowers; calyx pubescent, the segments narrowly oblong, acute, nearly equal; achenium turgidly ovate-lenticular, pointed.—First collected by Frémont in Nevada; rather frequent in the Truckee, Humboldt and Unionville Valleys, at the base of the foot-hills; 4,500 feet altitude. May–July. PLATE XXXIV. Fig. 1. A plant; natural size. Fig. 2. A node, bracts, involucre and flowers; enlarged three diameters. Fig. 3. A flower, expanded; enlarged eight diameters. (1,043.)

CHORIZANTHE[1] BREVICORNU, Torr. *T. & G., l. c., p.* 196. Annual, grayish-puberulent, about 4′ high; leaves mostly radical, linear or spatulate-obovate, entire; bracts rather small, uncinate-mucronate; involucres for the most part scattered along the somewhat scattered branches of the panicle, narrow-prismatic, 6-costate, the stout ribs excurrent into subulate recurved awns terminating the herbaceous nearly equal teeth, which are 3–5 times shorter than the tube (2–3″ long, and scarcely ½″ broad;) lobes of the calyx entire; stamens 3, inserted near the base.—Southeastern California and Western Arizona. Base of foot-hills near the Big Bend of the Truckee; May, not yet in flower. (1,044.)

CHORIZANTHE RIGIDA, Torr. *T. & G., l. c., p.* 198. Annual, at first woolly; stem ½–1′ high, slightly branched, finally more dense and woody; leaves ovate or obovate, 4–8″ long, entire, obtuse or acutish, pointless, long-petioled, white-tomentose beneath; involucres coriaceous, triangular, 6-costate, 3-cleft, sessile in the axils, solitary or crowded; lobes not margined, unequal, ovate or triangular-lanceolate, terminated by a straight spiny cusp, longer than the transversly veined short-campanulate tube; subtending bracts elongated and awn-shaped or lanceolate, spinescent-cuspidate, at length indurated; flowers pedicelled, with slender bractlets; tube of the 6-lobed calyx cylindric, obtuse at base; stamens 9, inserted on the throat, with short filaments and anthers.—Bracteal spines becoming ½′ or more long, and the older involucres scarious between the reticulations; calyx yellowish; cotyledons rounded, accumbent on the base of the slender curved radicle. Southeastern Cali-

[1] CHORIZANTHE, R. BROWN. (Including *Mucronea*, Benth. and *Acanthogonum*, Torr.) Involucre 1-flowered, gamophyllous, not appendaged at base, the tube usually angled or costate, the 2–6 teeth or lobes usually unequal and almost always terminated by a cusp or awn. Flower included or slightly exserted, subsessile or shortly pedicelled. Perigonium thin or petaloid, 6-lobed or parted. Stamens 9, rarely 3 or 6. Achenium triangular. Embryo as in *Eriogonum*, sometimes straight with rather narrow cotyledons, sometimes incurved-eccentric, or with broad cotyledons more or less accumbent to the radicle.—Low; involucres sessile, in cymes or scattered; leaves opposite and verticillate, or the lower usually alternate. T. & G., *l. c.*

PLATE XX.

fornia, Arizona, and New Mexico. With the last, and also near Humboldt Lake, Western Nevada; May. (1,045.)

Chorizanthe Watsoni, T. & G.; *l. c., p.* 199. Small, annual, hoary-pubescent, the at length sub-cymosely branched stem 1–3′ high; leaves 2–8″ long, 1″ wide, narrowly spatulate or lanceolate, petioled, acutish, pointless, entire; involucres somewhat scattered, panicled, coriaceous, the 5 teeth not margined, very unequal and, like the small acerose-subulate bracts, terminating in a recurved cusp, one (rarely 2) larger or broad and leafy, often nearly equaling the smooth cylindric (1½–2½″ long) tube, the rest subulate and small; flower included, on a slender pedicel; tube of the yellow 6-lobed calyx cylindric, the lobes slightly pubescent, acute; stamens 9, inserted on the throat, the filaments and anthers short; seed linear-subulate; embryo straight; cotyledons linear, longer than the radicle.—Collected by Dr. Torrey and Stretch, in Western Nevada. Rather frequent on the dry wash of the foot-hills from the Humboldt to Reese River; May–July. Plate XXXIV. Fig. 4. A plant; natural size. Fig. 5. Involucre, laid open, and flower; enlarged four diameters. Fig. 6. Flower, laid open; enlarged twelve diameters. (1,046.)

Oxyria digyna, Campd. White Mountains of New Hampshire, Labrador, and Greenland, and on the Arctic Coast to Behring Strait; Unalaska, and southward in the mountains to Colorado and California. East Humboldt, Clover, Wahsatch and Uinta Mountains; 8,500–11,000 feet altitude, in the moist crevices of shaded rocks; July–September. (1,047.)

Rumex venosus, Pursh. *DC. Prodr.* 14. 43. Stem branched, 1° high; leaves thick, flat, glabrous, petioled, the lowest ovate-subcordate at base, the rest ovate-lanceolate or oblong, acute, attenuate at base; panicle leafy only at base; raceme axillary and terminal, solitary, simple, sessile, the fascicles 3–8-flowered; flowers perfect, on capillary pedicels, jointed at the base and equaling the valves; valves equal, orbicular, deeply cordate, entire, closely reticulate-veined, destitute of callus, becoming greatly dilated.—Leaves often 4′ long and 1½–2′ wide, on rather short petioles; valves bright rose-color at maturity, 9–12″ in diameter; outer sepals finally deflexed, about equaling the sinus of the valves. From the Saskatchewan to the Columbia and southward to New Mexico and California. Foot-hills of the West Humboldt and Pah-Ute Mountains, Nevada; 5,000 feet altitude; May, June. (1,048.)

Rumex longifolius, DC. *Prodr.* 14. 44. Stout, 3–5° high; leaves elongated, acute, undulate, the lowest oblong, subcordate or obtuse at base, 6–15′ long, 2–4′ wide, long-petioled, the upper lanceolate, attenuate at each end, and the uppermost linear; petioles flat above, with a thin linear margin; panicle simple, leafless above, the racemes sessile; valves about 2½″ in diameter, broad-ovate, slightly cordate, obtuse, finely reticulated, subentire, without callosities.—Referred by Hooker and others to *R. aquaticus.* In the Saskatchewan region, and on the Western Coast from Unalaska and Sitka to California; Colorado, (498 Vasey.) Ruby and Huntington Valleys, Nevada; also in the Uintas; 6–7,000 feet altitude; July–August. (1,049.)

Rumex Britannica, L. New York to Illinois and the Upper Missouri; southward in Texas and New Mexico. Jordan Valley, Utah, on Cottonwood Creek; July. (1,050.)

Rumex salicifolius, Weinm. Coast of New England, Newfoundland, and from the Great Bear Lake and Sitka to Western Texas, New Mexico, and California. In the valleys from the Truckee River, Nevada, to the Wahsatch; 4–6,000 feet altitude; July–September. (1,051.)

Var. (?) Leaves undulate, truncate or cordate at base; valves 1″ long, narrowly winged, subrhomboidal, acute or acuminate, subdenticulate.—The same as 1780 and 1781 Wright, from Frontera on the Rio Grande, referred in the Botany of the Mexican Boundary to this species, but perhaps distinct. (1,052.)

Rumex maritimus, L. Sea-shore from Massachusetts to Virginia; from Hudson's Bay to the Saskatchewan and Washington Territory and southward to Illinois, Western Texas, New Mexico and California. Variable in height and habit. Truckee and Ruby Valleys, Nevada, in Salt Lake Valley, and in Provo Cañon in the Wahsatch; 4–6,000 feet altitude; July–October. (1,053.)

Rumex (Acetosa) paucifolius, Nutt., Ms. in Herb. Gray. (*R. Engelmanni,* Var. ? *Geyeri,* Meisn. *DC. Prodr.* 14. 64.) Perennial; stem erect, simple, rather slender, 1½–3° high; leaves 2–4′ long, 9–15″ wide, petioled, lanceolate, acute, entire, flat, attenuate at each end; panicle simple, nearly leafless; pedicels longer than the flower, articulated below the middle; valves 2″ in diameter, broad-ovate, cordate, entire, reticulately veined, naked, thin and purplish.—Rocky Mountains of Idaho and Montana, (Nuttall, 488 Geyer.) Parley's Park in the Wahsatch; 6,000 feet altitude; June. Resembling *R. hastatulus,* Bald., (*Muhl. Cat.,* 2. *ed., p.* 37. *Ell. Sk.* 1. 416; this name dropped

by Meisner in *DC. Prodr.* and *R. Engelmanni*, Ledeb. adopted, on account of a prior *R. hastulatus*, Sm., which, however, he himself refers to *Mühlenbeckia Chilensis*,) but of stouter habit, with lanceolate, not at all hastate leaves, and the valves larger, entire and rather less obtuse; they are somewhat erose in *P. hastatulus.* (1,054.)

Polygonum aviculare, L. From latitude 65° southward to the Gult and Mexico. A prostrate or in the young state ascending form, with small leaves, 4–8‴ long and 1–2″ broad, and the flowers mostly in short dense and leafy racemes, the floral leaves but 2–3‴ long and 1″ or less wide. West Humboldt Mountains and Ruby Valley, Nevada; 5–6,000 feet altitude; August, September. (1,055.)

Var. latifolium. Prostrate or ascending; leaves oblong, obtuse; flowers distant; sepals 5–6, often yellowish, as also the whole plant; achenium more or less minutely tuberculate.—A common form. Toyabe Mountains near Austin, Diamond Valley, and in the Wahsatch; 5–6,000 feet altitude. (1,056.)

Var. erectum, Roth. 1–3° high, somewhat yellowish; leaves lanceolate, 1–2′ long, 2–6″ wide, acute; inflorescence as in the last; sepals more usually 6, when but 5 one side of the achenium is without its sepal; achenium sometimes perfectly smooth.—Some of the specimens are very good *P. ramosissimum*, but it seems impossible to draw a line of distinction. Frequent through Western Nevada; 4,500–6,000 feet altitude; July–September. (1,057.)

Polygonum (Avicularia) minimum. Annual, dwarf and alpine, 1–2′ high, very slender, suberect, simple or branched from the base; stems angular, minutely puberulent, leafy to the apex; leaves ovate or ovate-oblong, 2–4″ long and 1–2″ wide, acute, narrowing abruptly into a very short petiole, somewhat glaucous; sheaths somewhat obliquely truncate, acuminate, not fringed; flowers on short pedicels, nearly 1″ long; sepals 5; achenium oblong-acuminate, perfectly glabrous.—A minute and delicate form, rarely over an inch in height, closely related to *P. aviculare.* Wahsatch and Uinta Mountains; 9–11,000 feet altitude; August. (1,058.)

Polygonum tenue, Mx. From Canada to the Carolinas and west to the Saskatchewan; Washington Territory to California; New Mexico. On the mountains and foot-hills through Nevada and Utah; 5–7,000 feet altitude. Fruit reflexed. (1,059.) Var. Leaves broader, usually dark green and

shining. Havallah and East Humboldt Mountains, Nevada; 7,000 feet altitude. (1,060.)

Var. LATIFOLIUM, Eng. *Proc. Acad. Phil.*, March, 1863, *p.* 75. Low; leaves oblong; spikes crowded, the upper bracts pointless.—A small state of the last. Clover Mountains, Nevada; 9,000 feet altitude; September. (1,061.)

POLYGONUM COARCTATUM, Dougl. *DC. Prodr.* 14. 101. Stem erect, 6–12′ high, dichotomous, terete, smooth; branches filiform, erect; sheaths semi-hyaline, 2-nerved, at length 2-parted and lacerate; leaves lanceolate or linear, 1–1½′ long, acute, 1-nerved, veinless, revolute on the margin; spikes filiform, 2–3′ long, loose, interrupted at base, leafless above; bracts 1–2-flowered; calyx open, at length closed, 2″ long, lobes oblong, deflexed, obsoletely carinate-triangular; achenium inclosed, very smooth, shining, the face ovate-oblong.—Branchlets angled, very minutely scabrous-punctate; bracts hyaline, exceeding the subsolitary pedicels, the lower terminating with a short subulate leaf, the upper leafless and pointless; flowers becoming pendulous; achenium occasionally minutely roughened, as described by Hooker. Idaho and Washington Territory. Var. MINUS, Meisn. Low, ½–3′ high, sparingly branched; leaves narrow, (6–9″ long ½″ wide,) smooth; spikes short, (½′,) densely flowered; calyx 1″ long, with obovate lobes.—Achenium glabrous or more or less tuberculate-striate, even upon the same plant; leaves often more oblong, 2–3″ long and nearly 1″ wide, imbricated. Arctic America, (Franklin;) Oregon, (Spalding.) It is *P. confertifolium*, Nutt, in Herb. Gray., with "rugulose-striate" achenia, from the "Columbia Plains," and also his *P. imbricatum*, with glabrous achenia, from the Rocky Mountains; also 493 Hall & Harbour from Colorado and 125 Torrey from near Donner Lake, California. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch; 6,500–9,500 feet altitude; June–September. (1,062.) A more slender form, with shorter and few-flowered spikes. Wahsatch Mountains; 6–7,000 feet altitude. (1,063.)

POLYGONUM AMPHIBIUM, L. Northern States and Canada to the Great Slave Lake; from Washington Territory to California, and in the mountains eastward, and in New Mexico and Sonora. Valleys of Nevada, and Parley's Park in the Wahsatch; 4,500–6,000 feet altitude; June–September. (1,064.)

Var. TERRESTRE, Willd. On stream-banks in the Wahsatch. (1,065.)

POLYGONUM PERSICARIA, L. Malade Valley, at a sheep-ranch; introduced. (1,066.)

POLYGONUM LAPATHIFOLIUM, Ait., Var. INCANUM, Koch. New York, Lake Superior region and on the Saskatchewan; rare. In Provo Cañon of the Wahsatch; 6,000 feet altitude; July. (D. C. Eaton.)

POLYGONUM VIVIPARUM, L. White Mountains of New Hampshire, and from Lake Superior to Labrador and the Arctic Sea, Greenland and Behring Strait; southward in the mountains to Colorado and California. Clover Mountains, Nevada, and in the Uintas; 8–11,000 feet altitude; July–September. (1,067.)

POLYGONUM BISTORTA, L. *DC. Prodr.* 14. 125. Rhizoma thick and twisted; stems annual, very simple; sheaths long and striately nerved; leaves glabrous or puberulent beneath, the lowest cordate, obtuse, with a long winged petiole, the upper subsessile, the highest linear or abortive; spike dense, oblong, obtuse; pedicels exceeding the flowers; stamens exserted.—Var. OBLONGIFOLIUM, Meisn. Stem simple, ½–2° high; leaves glabrous, the lowest oblong, the blade 3–8′ long, 1–2′ broad, scarcely decurrent by an abruptly attenuate base into a very long petiole; spike oblong, ½–2′ long.—From Behring Strait and the Arctic Coast southward in the mountains to California and New Mexico. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 6–9,000 feet altitude; July–September. (1,068.)

Var. LINEARIFOLIUM. Leaves very narrow, attenuate at base, 3–6′ long, 1–4″ wide; spike short, (6–9″;) stem 1½° high.—East Humboldt Mountains, Nevada; 9,500 feet altitude. (1,069.)

POLYGONUM CONVOLVULUS, L. Jordan Valley, Utah; introduced. (1,070.)

POLYGONUM (ACONOGONON) POLYMORPHUM, Ledeb. *DC. Prodr.* 14. 139. Stem erect, branched; sheaths large, membranous, pubescent, striately veined, not ciliate, obliquely truncate, soon lacerate, subdeciduous; leaves short-petioled, ovate-oblong, lanceolate or linear, narrowed or rounded at base, ciliolate, pubescent or glabrous; panicle terminal, exceeding the leaves, of compound many-flowered racemes; bracts small, membranous, not ciliate, 2–3-flowered; pedicels exserted, in fruit shorter than the calyx; calyx petaloid, 5-parted, not glandular, slightly enlarging; stamens 8; style very short, 3-cleft; achenium triangular, equaling or scarcely exceeding the calyx, smooth and shining, with oval-rhomboid faces; cotyledons accumbent, sunk in a depression of the albumen. Var. *a.* ALPINUM, Ledeb. Stem glabrous; sheaths pilose or rather rarely glabrous; leaves ovate-oblong or lanceolate, acuminate, shortly attenuate at base, flat, slightly pubescent, or glabrate above; panicle

ample, pyramidal, at length rather loose.—The specimens are 2° high, glabrous throughout; leaves lanceolate, 2–3′ long and 6–9″ wide; sepals yellowish-white, open and not at all appressed to the achenium; scantily fruiting; achenium 3″ long. East Humboldt Mountains, Nevada; on dry slopes; 7–8,000 feet altitude; August. Var. *lapathifolium* was found at Kotzebue Sound by H. & A. Specimens collected by Dall on the Youkon, and by Dr. Torrey (425) near Donner Pass, California, all with broadly ovate leaves, connect the two varieties. (1,071.)

## ELEAGNACEÆ.

SHEPHERDIA CANADENSIS, Nutt. From Vermont to Newfoundland and Wisconsin, northward to the Arctic Circle and west to the Rocky Mountains and Washington Territory; south in the mountains to Wyoming, Colorado and New Mexico. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch and Uintas; 6–9,000 feet altitude; July–September. (1,072.)

SHEPHERDIA ARGENTEA, Nutt. *DC. Prodr.* 14. 608. Leaves elliptic or oblong-ovate, obtuse, attenuate at base, silvery on both sides, as well as the branches and flowers, slightly dotted with ferruginous scales; filaments pubescent.—A shrub 8–15° high, somewhat spiny; the leaves very variable in size, ½–2′ long and 2–10″ wide; berries 2″ in diameter, scarlet, pellucid and edible. From the Saskatchewan southward; Utah, (Stansbury;) Nevada, (Anderson and Torrey;) New Mexico, (Fendler.) Frequent on stream-banks in Western Nevada. Fruit ripening in July. (1,073.)

ELEAGNUS[1] ARGENTEA, Pursh. *DC. Prodr.* 14. 609. A stoloniferous unarmed shrub, 6–12° high, the younger branches covered with ferruginous scales; leaves 1½–4′ long and 9″–2½′ wide, broadly or narrowly elliptic, rather acute at each end, or lanceolate and undulate, silvery-scurfy and more or less ferruginous; flowers numerous, deflexed, silvery without, pale yellow within, fragrant, 3–5″ long, the tube broadly oval, the limb funnelform; fruit globose-ovoid, dry and mealy, edible, 4–5″ in length. Canada and west to the Saskatchewan and Rocky Mountains, to latitude 68°; Northern Minnesota and

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[1] ELEAGNUS, L. Flowers perfect. Calyx-tube including the free ovary, the limb cylindric-campanulate or tubular below, parted above into 4 valvate deciduous lobes, colored within. Disk glandulose. Stamens 4, adnate to the calyx and alternate with its lobes, the free portion of the filaments very short; anthers oblong. Style simple, straight; stigma 1-sided. Fruit drupe-like, covered with the thickened dry or fleshy closed calyx-tube; the stone oblong, 8-striate.—Trees or shrubs, with alternate entire petioled leaves and axillary pedicelled flowers.

on the Upper Missouri; Wyoming Territory, (Frémont.) Found on Bear River, Utah, above Evanston; in fruit, July and August. (1,074.)

## SANTALACEÆ.

COMANDRA PALLIDA, DC. *Prodr.* 14. 636. Stems several from a branched woody caudex, herbaceous, striate, erect, 6–10′ high, branching above; leaves alternate, bluish, somewhat punctate on the margins, the lower elliptic-oblong, mucronate-acute, 8–12″ long and 2–3″ wide, the uppermost usually linear-lanceolate, 5–10″ long and about 1″ wide, sometimes so continued down the stem, (forming Var. *angustifolia;*) cymes terminal, few-flowered; bracts linear-lanceolate, 2″ long; flowers perfect; calyx-lobes erect-spreading; fruit 3″ in diameter, with subfleshy epicarp.—Flowers precisely as in *C. umbellata;* distinguished especially by its narrowed upper leaves and much larger fruit. From Oregon to Colorado and New Mexico. Diamond and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–8,500 feet altitude; May–July. (1,075.)

## CERATOPHYLLACEÆ.

CERATOPHYLLUM DEMERSUM, L. (?) Not in fruit; leaves short, (5–7″,) linear, strongly sinuate-dentate, the teeth aculeate with a curved white prickle. Canada to the Saskatchewan and southward to the Gulf and New Mexico. Found in Spanish Spring (warm) near Glendale, Nevada; December. (1,076.)

## EUPHORBIACEÆ.

EUPHORBIA POLYGONIFOLIA, L. A single flowering specimen, collected by Dr. Palmer in Southern Utah, accords with the eastern form except that the leaves are acute. Sandy shores of the Atlantic and Great Lakes, from Canada to Florida; also reported from Southern Idaho, (Tolmie.)

EUPHORBIA OCELLATA, Dur. & Hilg. *Pac. R. R. Surv.* 5, (*Bot. Williamson's Rep.,*) *p.* 15, *t.* 18. Annual, glabrous, somewhat fleshy, becoming glaucous; stems prostrate, dichotomously many times branched, somewhat thickened at the rather remote forks; leaves 3–5″ long, 2″ broad, short-petioled, entire, revolutely margined, ovate-deltoid, oblique and cordate at base, acutish; stipules many-cleft, setaceous, the upper connate; involucres scarcely 1″ long, axillary, solitary or cymose, short-pedicelled, turbinate-cam-

panulate, somewhat 5-angled, the lobes yellowish, short, 3–4-toothed; glands 2–3, stipitate, round-cupshaped, rose-colored, with a very narrow or obsolete annular appendage; styles short, entire; carpels convex; seed spherical, somewhat angled, smooth and ash-colored.—California. In sandy sage-plains near the Big Bend of the Truckee and Carson Desert, Nevada; 4,000 feet altitude; May–August. (1,077.)

EUPHORBIA SERPYLLIFOLIA, Pers. From Wisconsin, New Mexico and Texas, westward to Oregon and California; Western Nevada, (15 Anderson, 476 Torrey.) In the valleys from Western Nevada to the Wahsatch, usually in alkaline or saline soils; 4–6,000 feet altitude; May–September. (1,078.)

EUPHORBIA GLYPTOSPERMA, Eng. Prostrate or ascending. From Illinois and Canada to the Saskatchewan and southward to Arkansas and New Mexico. Sandy creek-bottoms at west base of the Wahsatch; 5,000 feet altitude; July–October. (1,079.)

EUPHORBIA DICTYOSPERMA, F. & M. Kentucky to Louisiana and Texas, and westward to California and Oregon. Antelope Island, Salt Lake; June. (1,080.)

EUPHORBIA (ESULA) MONTANA, Eng. *DC. Prodr.* 15. 2. 148. Perennial, very glabrous, glaucous; stems many from a thick rootstock, ascending, leafy, shortly branched from the upper axils or often simple; leaves scattered, rather thick, subsessile, entire, rounded at base, ovate, obtuse, the uppermost subverticillate; floral bracts orbiculate-triangular, rarely subcordate, very obtuse, mucronulate, broader than long; inflorescence umbellate, the rays becoming repeatedly dichotomous; involucre turbinate, roughish within, the lobes oblong-linear, velvety; glands transversely oblong, truncate, very shortly 2-horned; styles very short, bifid, thickened at the apex; capsule 2″ long, ovate, smooth; seeds oblong, superficially pitted, caruncle shortly conical.—The specimens are 8–15′ high, the leaves very variable in size, 4–15″ long; floral bracts smaller, 3–6″ wide. From the Upper Platte to New Mexico, Arizona and Sonora. Frequent in the Wahsatch and Uintas; 7–7,500 feet altitude; June–August. (1,081.)

CROTON (HENDECANDRA) PROCUMBENS, Esch. Diœcious, shrubby at base, 1–2° high, with loose slender alternate branches, or the upper opposite, whitish stellate-pubescent and more or less silvery-scurfy; leaves on slender petioles, elliptic or narrow-oblong, ½–2′ long, 2–6″ wide, entire, obtuse or acute at the base and apex; axis of the sterile racemes becoming elongated,

(sometimes 2–6′ long,) the flowers deciduous; calyx 5-parted; petals none; glands scale-like; stamens 6–12; filaments villous; pistillate flowers subsolitary; calyx 5-parted; petals none; ovary with an obscurely 5-lobed hypogynous disk, globose, 3-celled; stigmas sessile, deeply 2–3 times cleft; capsule 3″ in diameter.—From Western Texas and Northern Mexico to Southern California, and north to San Francisco; Southern Utah, (Palmer, 1870.)

## URTICACEÆ.

CELTIS OCCIDENTALIS, L., Var. PUMILA, Gray. 2–6° high. All our forms (excepting *C. pallida*, Torr.) may apparently be referred to this species, ranging from New England and Canada to Oregon, and southward to Florida, Texas and New Mexico. In the East Humboldt Mountains, Nevada, very rare; frequent in the Wahsatch, and on Stansbury Island; 4,200–6,500 feet altitude; May–July. (1,082.)

URTICA DIOICA, L., Var. OCCIDENTALIS. Monœcious or sometimes wholly staminate, 3–6° high; leaves ovate or ovate-lanceolate, acuminate, coarsely serrate; stem and leaves (especially beneath) covered with a fine velvety pubescence; bristles more or less numerous.—190 Anderson, from near Carson City; a New Mexican specimen in Herb. Gray, (196 Parry, 1867,) is probably the same, though but 1° high, more densely prickly and less pubescent. Frequent on stream-banks in Nevada and in the Wahsatch; 5–6,000 feet altitude. *U. gracilis*, Ait., is referred to this species by Dr. Hooker and others. (1,083.)

PARIETARIA PENNSYLVANICA, Muhl. More or less hispid throughout, as usual, instead of downy as described. From Vermont, Wisconsin, and the Saskatchewan to Tennessee, Colorado and New Mexico. Shade of rocks in the East Humboldt Mountains, Nevada, and in the Wahsatch; 4,500–6,500 feet altitude; June–September. (1,084.)

HUMULUS LUPULUS, L From Canada and the Saskatchewan to Georgia, Arkansas, and New Mexico. Frequent in the Wahsatch and Uintas; 6,000 feet altitude. (1,085.)

## CUPULIFERÆ.

QUERCUS ALBA, L., Var. GUNNISONII, Torr. *Pac. R. R. Surv.* 2., (*Beckwith's Rep.*,) *p.* 130. (*Q. stellata*, Wang., Var. *Utahensis*, A. DC.) In some respects intermediate between *Q. alba* and *Q. stellata*, (*Q. obtusiloba*, Mx.,)

but rather to be referred to the former, having a similar though smaller leaf, (3–5′ long,) with 3–4 pairs of rather narrow oblong subequal lobes, opposite or alternate, obtuse and subentire, with no tendency toward the fewer rounded divergent unequal lobes that characterize the leaf of *stellata*, yet with much of its yellowish downy pubescence, only occasionally becoming nearly glabrous; it has also the glabrous anther of *alba*, (though otherwise described by De Candolle,) the longer peduncle, the same proportioned shallower cup, 4–7″ (usually 5″) broad and 3″ deep, with convex inflated scales; the acorn is considerably smaller than that of *alba*, usually 9″ long and 5″ in diameter, sometimes much shorter and scarcely exserted from the cup. Usually low and scrubby, covering the foot-hills, but at times attaining 1–1½° in diameter and 20° in height, with the bark and all the habit of *Q. alba*. 515 Hall & Harbour, referred to *Q. Douglasii*, Var. *Nova Mexicana*, is the same. Not seen west of the Wahsatch, but extending east to Colorado and south to latitude 38°; 5–7,000 feet altitude. (1,086.)

CASTANOPSIS[1] CHRYSOPHYLLA, A. DC. *Prodr.* 16. 2. 109. (*Castanea*, Hook.) Leaves 4–5′ long, evergreen, broadly lanceolate, acuminate, acute at base, entire, coriaceous, deep-green and glabrous above, the younger ones especially covered beneath with golden-yellow scales; stipules ovate-lanceolate, caducous; aments densely flowered, half shorter than the leaves; styles 3, erect and subdivergent, glabrous, linear; fruit crowded, densely prickly.—A tree of Oregon and California, becoming 60–100° high, and 1–3° in diameter. Var. MINOR, Benth. A shrub 2–6° high, with smaller leaves, 1–2½′ long, 6–9″ wide, often obtuse, and acute or obtuse at base, on petioles 3–6″ in length. Stipules subpersistent, 1″ long; aments pubescent, with the small lanceolate bracts sometimes hidden between the fascicles; spikes androgynous, the fertile flowers surrounded by broad ovate bracts and scales; calyx pubescent except at base, lobes ovate, doubly serrate; stamens often abortive; scales of the finally dehiscent involucre becoming elongated (some-

[1] CASTANOPSIS, SPACH. Sterile flowers fascicled, surrounded by bracts, in an ament. Calyx regularly 5–6-lobed. Stamens usually twice as many as the lobes; filaments slender, elongated; anthers very small, 2-celled. Rudimentary pistil globose, free, hirsute. Fertile flowers 3–1, in a scaly involucre. Calyx 6-parted, lobes obtuse, in two rows. Styles 3, (rarely 3–5,) linear, opposite the outer calyx-lobes. Ovary 3-celled; cells 2-ovuled; ovules amphitropous from the lower angle. Fruit consisting of the involucre and 3–1 included cartilaginous free nutlets; involucre globose, beset with usually branched prickles growing tardily from the scales, rarely crested with subconical tubercles, closed, at length irregularly cleft or indehiscent. Seeds by abortion solitary; cotyledons thick, mealy, plano-convex; radicle superior.—Trees of Asia and California, with the habit and inflorescence of some Asiatic sections of *Quercus* and the fruit of *Castanea*, but the ovary 3-celled; fruit maturing the second year.

times 1′ long) and covered with divergent branched subverticillate prickles; nut 6″ in diameter, obtusely triangular, glabrous.—California and Oregon. Washoe Mountains, Nevada, above Carson City; 6,500 feet altitude. (1,087.)

## BETULACEÆ.

Betula occidentalis, Hook. *Flor. Bor. Amer.* 2. 155. Branches dark reddish-brown, copiously sprinkled with resinous warts; leaves 1–1½′ long, 9–15″ wide, thin, broadly ovate, acute, truncate at base or sometimes subcuneate or slightly cordate, with rarely more than four pairs of nerves, smooth and resinous above or minutely appressed-hairy, lighter-colored beneath, usually with scattered hairs upon the petioles, margins and veins, not punctate, somewhat obscurely lobed or doubly toothed, the serratures short and glandularly mucronate; petioles slender, 3–5″ long; fruiting aments broad-cylindrical, 1′ long; peduncles suberect, leafy, 3–5″ long; scales pubescent, ciliate, the lateral lobes divergent, quadrangular; seed with wings twice broader than the body.—A shrub 8–12° high, with numerous scarcely erect stems, rarely 3–4′ in diameter, and a dark purplish-brown close smooth bark. From the Rocky Mountains in latitude 54° to Washington Territory and southward to Colorado.—Frequent on stream-banks in the Wahsatch and Uintas; 5–6,000 feet altitude. It is 339 Parry, 518 Hall & Harbour, and 528 Vasey, from Colorado, and was also collected by Nuttall. Regel makes this both the type of his subspecies *occidentalis* under *B. alba*, and his Var. *humilis* of subspecies *papyrifera*, adding to both certain forms of *B. papyracea*. The White Mountain variety of *B. papyracea* is quite distinct from the present, and cannot be considered as tending to unite the two species. Plate XXXV. Fig. 1. End of branch; natural size. Figs. 2, 3. Scales. Figs. 4, 5. Seeds; enlarged four diameters. (1,088.)

Betula glandulosa, Mx. From Newfoundland and Labrador, Northern New England and the Great Lakes to the Arctic Ocean and Behring Strait, Alaska, Oregon, and Colorado. Found on stream-banks in the Uintas; 8–9,000 feet altitude. (1,089.)

Alnus incana, Willd., Var. glauca, Ait. Leaves ovate, doubly and sharply serrate, obtuse at base or slightly cordate, rarely subcuneate, subacute or rarely subacuminate; more or less pubescent on both twigs and leaves, or sometimes nearly glabrous; seeds with a narrow coriaceous margin.—From New England to Saskatchewan; thence south to New Mexico

and west to Oregon. Washoe Mountains and Truckee Valley, Nevada; at City of Rocks in Southeastern Idaho, and in the Wahsatch and Uintas; 4–7,000 feet altitude. This is the prevalent western form, often collected, but variously referred. It is 422 Frémont, (1845,) 811 Fendler from New Mexico, 215 Geyer, 340 Parry, and 519 Hall & Harbour from Colorado, (the last called *A. rubra* by Regel,) 530 Vasey, 104 Anderson, &c. It must include Regel's *A. serrulata*, Var. *rugosa*, for all the localities but perhaps California. (1,090.)

## SALICACEÆ.

SALIX LONGIFOLIA, Muhl. From the Northern States and Canada to the Arctic Circle and the Pacific; in Arkansas, Texas, New Mexico, and California. The most common willow of Nevada and Utah, usually in dense clumps, 3–8° high; stems erect and rarely exceeding 1′ in diameter, with grayish bark; very variable in pubescence, size of the leaves, &c. This number includes specimens having the fertile aments 1′ long, densely crowded with glabrous capsules, terminal (or often apparently lateral) and mostly solitary upon the extremities of the branchlets; leaves pubescent, becoming glabrate, 2–3′ long and 2–3″ wide. 4–6,000 feet altitude; May–August. (1,091.)

Another common form has the catkins in clusters of 4–8 at the extremities of the branches, the fertile ones 1–2½′ long, densely crowded; capsules ovate-conic, villous-pubescent and nearly sessile; leaves 2–4′ long, 2–7″ wide, becoming glabrous. (1,092.)

A rarer form, approaching *S. Hindsiana*, Benth., was collected on sandy foot-hills near Carson City, Nevada, with the fertile aments solitary and terminal upon the short leafy branchlets, about ½′ in length, very loosely fruited; capsules long-conical, glabrous, the pedicel exceeding the gland; the still rather young leaves less than an inch long, 1″ wide; 3° high, divaricately branching, with slender virgate branchlets and yellow bark. (1,093.)

Var. ARGYROPHYLLA, Nutt. *DC. Prodr.* 16. 2. 214. Leaves and capsules covered with a glistening silvery tomentum.—A common form, with the silky tomentum more or less abundant; aments solitary and terminal, short, ½–1′ long, and rather densely flowered; leaves very variable, 1½–5′ long and 1–6″ wide. (1,094.)

SALIX CORDATA, Muhl., nearly Var. ANGUSTATA, And. The species is

found from New England to Missouri and the Saskatchewan and northward to the Arctic coast; Oregon and Colorado. Frequent through Nevada and Utah; 4–7,000 feet altitude. Various forms occur in the collection, more or less distinct; the present with leaves 3–6′ long and 6–18″ wide, rounded or subcuneate at base, very long acuminate, finely serrulate, glabrous, glaucous beneath; stipules often large and serrate; aments 1–3′ long, on rather long peduncles. Becoming a small tree, 15° high and 18′ in diameter, with usually slender virgate branchlets and rather dark-green bark. (1,095.)

Var. Leaves 1½–3′ long, 6–12″ wide, mostly rounded at base, very short-acuminate, serrulate or nearly entire, occasionally subvillous beneath; aments 1′ long, on short peduncles. Usually about 8° high, less virgately branched than the last. (1,096.)

Var. (?) Leaves still smaller, 1–2′ long, 4–9″ wide, mostly subacute at base, acute or short-acuminate at the apex, entire or subserrulate, 1′ or less in length, on short peduncles. 6–15° high, and occasionally 12–18′ in diameter, diffusely branching, the branchlets short and divaricate; bark light yellowish-green. Of well-marked habit, and perhaps a distinct species, but seems to be united through the last variety with the true *cordata*. (1,097.)

S. —— (?) Allied to *S. cordata*. Fertile aments (2′ long) on short and leafy densely villous peduncles, densely flowered; scales dark, orbicular, entire, very villous both sides, twice longer than the gland and about half as long as the slender pedicel (1″ long;) capsule long, conical, glabrous; style rather slender; stigmas entire, suberect; leaves 1¼′ long, 3–5″ wide, spatulate, narrowed to the base, on short (1–1½″) petioles, obtuse or subacute, entire, densely covered with a short silky pubescence when young, wholly glabrous and rather thick when old. 6–8° high; stipules obsolete. Found in a mountain cañon near Carson City, Nevada, where it was also collected by Anderson (11;) strongly marked, but not identified. (1,098.)

Salix glauca, L. *DC. Prod.* 16. 2. 280. Aments leafy, peduncled, cylindrical, subdensely flowered; scales acutish or obtuse, tawny at base and darker above, villous with long white hairs; capsules ovate-lanceolate, rather obtuse, densely white-tomentose, scarcely or shortly pedicelled, the pedicel equaling the nectary; style produced, usually bifid, the lobes of the stigma divaricate; leaves elliptic-lanceolate, usually silky-villous both sides, entire.—Arctic America; Rocky Mountains of Colorado. Var. pullata, And. Leaves becoming glabrous above, more or less villous and glaucous beneath, variable

in shape.—The specimens have lanceolate or oblanceolate leaves, 1–3′ long, 3–6″ wide, light-green, short silky-pubescent or subglabrous, especially above; young aments ½–1′ long, becoming 1–2′ in length at maturity. 2–3° high, diffusely branched, with short and stout branchlets. On the shores of subalpine lakes in the East Humboldt Mountains, Nevada, and in the Wahsatch; 9,000 feet altitude. June–August. (1,099.)

SALIX ARCTICA, R. Br. *DC. Prodr.* 16. 2. 286. Aments lateral and subterminal upon long strict leafy peduncles, erect, rather thick and densely flowered; scales obovate, obtuse, pale or dark-colored, pilose; capsule conic from an ovate base, tomentose or glabrous, the short pedicel rather exceeding the gland; style middle-sized, becoming brown, with divaricately parted stigmas; leaves obovate, oval or spatulate-lanceolate, entire or obsoletely and remotely serrulate, at length smooth, glaucous beneath.—In various forms, from latitude 64° to Behring Strait, the Arctic Sea, and Greenland; Unalaska; Labrador; Rocky Mountains of Colorado. In the Uintas, at 11–12,000 feet altitude, in broad clumps, a foot in height. Perhaps nearest Var. BROWNEI, And., but not according closely with any of the described varieties; leaves 1–1½′ long, 4–9″ broad, oblong or rather oblong-lanceolate, usually broadest above the middle, rounded at base, acute or short-acuminate, slightly woolly or silky-pubescent, becoming glabrous, glaucous beneath, remotely serrulate or entire; sterile aments small, 2–4″ long, the fertile ½–1′ long, on villous, not very long peduncles; scales dark and villous; capsules short-pedicelled, tomentose. (1,100.)

SALIX PHLEBOPHYLLA, And. *DC. Prodr.* 16. 2. 290. Aments upon lateral leafy branchlets or terminal, cylindric, rather short, densely flowered, erect; scales round-ovate, dark, pilose or bearded with long white hairs; capsules ovate-conic, brownish, puberulent, sessile; gland exceeding the base of the capsule; style elongated, brown, as well as the divaricately parted stigmas; leaves oblong-obovate, very shortly acuminate or subobtuse, coriaceous, persistent, entire, colored alike on both sides, almost always with scattered white hairs beneath and upon the margins, otherwise perfectly glabrous and shining, the parallel nerves strongly prominent on both sides.—In Northwestern Arctic America and Unalaska; also collected by Lyall on the summits of the Cascade Mountains. Uintas; 10–11,000 feet altitude; August. Very dwarf and slender, the leafy decumbent stems scarcely an inch in length; leaves 2–5″ long and 1″ wide; aments 3–4″ long. (1,101.)

Salix reticulata, L. *DC. Prodr.* 16. 2. 301. Decumbent, the branches leafy at the summit; ament terminal, very long peduncled, densely flowered, narrow-cylindric; peduncle leafy; scales yellowish-pink, rounded-ovate; capsules oval-ovate, sessile, hoary-tomentose; nectary somewhat cup-shaped, surrounding the base of the capsule and often exceeding it; style very short or none; stigmas 2-cleft, brown, divaricate; leaves petioled, round-elliptic, often rugose, pale-glaucous beneath, reticulately veined, entire.—Greenland and the Arctic coast, Labrador, Unalaska, and in the Rocky Mountains of Colorado. East Humboldt and Clover Mountains, Nevada, and the Uintas; 9–11,000 feet altitude; August, September. Stems rather stout, wholly prostrate, leafy only at the summit; leaves 6–9″ long, oblong or suborbicular, mostly rounded at the apex, obtuse at base or subattenuate into a long and slender petiole; sterile aments 2–4″ long and very loosely flowered; fertile aments also short, (3–6″,) densely flowered, on long naked peduncles. (1,102.)

Early specimens of some other species, too immature for determination, were collected in the neighborhood of Carson City, Nevada. (1,103.)

Populus tremuloides, Mx. From the Northern States, Newfoundland, and Canada, to the Arctic Sea and Oregon, and southward in the mountains to California (?), Arizona, and New Mexico. Frequent in the upper cañons of Nevada and Utah, rarely attaining 1° in diameter and 30° in height; 6–9,000 feet altitude. (1,104.)

Populus monilifera, Ait. From Western New England to Missouri, on the Arkansas and in Louisiana, and westward to California and Oregon. Not seen in Utah, and less frequent in Nevada. Referred by Wesmael in *DC. Prodromus* to *P. Canadensis*, Desf., but Aiton's name is much the older. (1,105.)

Populus balsamifera, L., Var. angustifolia. (*P. angustifolia*, James.) Branches terete, glabrous; leaves ovate-lanceolate, attenuate at base, acute, glabrous, crenate-serrate.—Leaves varying much between the ordinary growth (2–3′ long by 8–12″ wide, acute at base and often subrhomboidal) and that of the younger shoots where they may be 6–8′ long and 3′ or more broad, and often cordate at base; always with a long acumination. It is referred by Wesmael in the *Prodromus* to *P. monilifera*, (his *P. Canadensis*,) but its affinities are wholly with *P. balsamifera*, of which it is the narrow-leaved form, as *P. candicans* is on the opposite extreme the broad-cordate

variety. From Colorado and New Mexico to Washington Territory and California. Not seen west of Reese River, but it is the prevalent species eastward in Nevada and Utah; 5–7,000 feet altitude. (1,106.)

POPULUS TRICHOCARPA, Torrey. *DC. Prodr.* 16. 2. 330. Buds and younger branches viscid; leaves on rounded petioles, (1–2′ long,) broadly cordate-triangular, short-acuminate, glabrous, finely glandularly crenate-serrate, pale beneath, reticularly-veined; fertile aments about 1′ long in flower, 3–6′ in fruit, with laciniate densely villous scales; stigmas dilated at base; fruit sessile or shortly pedicelled, globose, tomentose; sterile aments 2′ long, sessile, densely flowered, with subvillous laciniately-fringed scales; stamens 20–30.—On the Santa Clara River, California, (Parry,) and from the Lower Fraser River, (Lyall.) A rather small tree in Truckee Valley and lower cañons of the Washoe and West Humboldt Mountains, Nevada; 4–5,000 feet altitude. (1,107.)

## GNETACEÆ.[1]

EPHEDRA[2] ANTISYPHILITICA, C. A. Meyer. *DC. Prodr.* 16. 2. 354. A low diœcious shrub, 2° high; branches opposite and fascicled, straight, sub-

[1] GNETACEÆ, BLUME. Flowers diœcious, monœcious, or rarely polygamous. Staminate aments:—Bracts decussately opposite or verticillate, more or less connate, or very rarely distinct. Calyx and corolla none; each flower with 2–4 bractlets, which are united to form a 2–4-lobed perianth. Stamens arising from the base of the perianth, solitary, or few with the filaments united; anthers 2-celled, the cells dehiscent by a pore at the apex; pollen oval, smooth. Fertile aments:—Bracts decussately opposite, or in threes, more or less imbricated and connate, the lower usually smaller, often thickened and fleshy in fruit. Flowers 1–3, each consisting of an urceolate perianth, (formed of 2–5 connate bractlets, *Parlatore*,) perforated at the apex and including the ovule. Ovule erect, solitary, terminating above in a rather long, usually terete, straight or twisted, exserted style-like process. Fruit dry, enveloped by the bracts and by the membranous or thickened perianth. Embryo in the axis or at the summit of the fleshy albumen; cotyledons 2; radicle superior.—Trees, shrubs, or undershrubs, with opposite ternate or fascicled branches, jointed at the nodes; leaves opposite or in threes, often reduced to a short-toothed or lacerated sheath.

[2] EPHEDRA, L. Flowers diœcious or rarely monœcious. Male aments subglobose, solitary or clustered, axillary, sessile or short-peduncled; bracts (rarely in threes) approximate or subimbricate, connate into 2–3-lobed involucres. Flowers solitary at each bract, the perianth often exceeding the involucre. Stamens 3–8; filaments united into a column usually exceeding the perianth, sometimes divided at the summit; anthers subrounded or narrowed and subcuneate at base, dehiscing by transverse oblong pores. Fertile aments solitary or few, usually short-peduncled, erect or nodding. Bracts (rarely in threes) forming 2–6 emarginate or 2–3-lobed involucres, the lower sterile, the upper one larger and 1–3-flowered. Ovule usually oval-oblong, the style-like process obliquely ligulate or discoid at the apex. Seed with a thin membranous testa; embryo axial and nearly as long as the albumen; cotyledons oblong; radicle long and cylindrical.—Shrubs and undershrubs, with numerous equisetoid terete sheathed branches; sheaths short, with usually 2–4 leafless or shortly foliaceous teeth.

In the above descriptions the terms are made to conform to the theory of the gymnospermous character of the Order. *Parlatore*, in the *Prodromus*, still considers what is here called the perianth of the fertile flower as the ovary with a true style and stigma. The following remarkable species compels a slight modification in the descriptions of the genus and of the Order, by its peculiar characteristic, the ternate arrangement of its leaves, branches and floral bracts. It has long been known and noticed as a

erect or divaricate, striate, smooth or minutely resinous-puberulent, yellowish-green; sheaths 2-cleft, the lobes ½–6″ long, entire, short-triangular, lanceolate or linear-subulate, at length deciduous; sterile aments 3–4″ long, the bracts opposite and imbricated, anthers about 8, sessile or short-stipitate, the united column of filaments 2″ long, twice exceeding the perianth and involucre; fertile aments solitary, short-peduncled, 1- or usually 2-fruited, with 4 pairs of broadly-ovate thickish scales connate at base; fruit 3–4″ long, sessile, oblong-ovate, nearly triangular, smooth; base of the radicle straight.—From Western Texas to California, Southern Utah, and Nevada. Abundant through Nevada, from the Sierras to the East Humboldt Mountains; 4–6,000 feet altitude; flowering in May and June, perfecting its fruit in July. The medullary portion of the stems abounds in a reddish-brown resin. The medicinal virtues of the plant are well known, and it has also been used as a substitute for tea. (1,108.)

The integument of the ovule is said to be single in the genus, but here it is plainly double, the two coats united over the lower two-thirds of the ovule but easily separable, and wholly free above. The deciduous styliform process is a tubular continuation of the outer coat, ligulate and not stigmatic at the top, but affording ready access for the pollen to the apex of the ovule. This apex is subcorneous and incorporates the bases of the attenuated albumen and embryo with the integuments. PLATE XXXIX. Fig. 1. A staminate branch. Fig. 2. A fertile branch. Fig. 3. Flowerless stems with well-developed leaves; all natural size. Fig. 4. Staminate ament. Fig. 5. Involucre, of connate bracts. Fig. 6. Single bract, showing obscure veins. Fig. 7. Joint of the rachis, with its opposite flowers. Fig. 8. Perianth, laid open, showing upper side of stamineal column. Fig. 9. Fertile ament; all enlarged four diameters. Fig. 10. Involucral bracts, enlarged two diameters. Fig. 11. Fruiting perianth, dorsal side. Fig. 12. Its ovule; both enlarged four diameters. Fig. 13. Ovule; enlarged eight diameters; the integuments on the ventral side removed and the styliform process detached,

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doubtful form, and is now published under the name provisionally proposed for it by Dr. Torrey in *Emory's Report*, p. 151. It was again collected the last season by Dr. Palmer in Arizona.

E. TRIFURCA, Torr. An undershrub with the habit of *E. antisyphilitica*, but the branches, the sheathing leaves, and the bracts of the aments in whorls of three; bracts thin and membranous, in 6–8 imbricated alternating whorls, those of the fertile aments dilated and orbicular, on short petioles which are scarcely connate at base; stamens 6–8; fertile flowers 1–3; perianth triangular, somewhat roughened or minutely rugose, about equaling the involucre; attenuated base of the undeveloped radicle elongated and somewhat coiled.—New Mexico; Arizona.

showing the albumen surrounded by the double testa, all united at the apex. Fig. 14. The removed integuments, the free portion of the outer coat separated from the horny apex of the ovule and folded back. Fig. 15. Vertical section of the albumen, showing its axial cavity and the partially developed embryo. Fig. 16. Embryo at a still earlier stage of growth.

Var. PEDUNCULATA. (*E. pedunculata*, Eng. *Bot. Simpson's Rep.*, ined.) Fertile aments more or less pedunculated, the peduncles sometimes 6″ long, straight or geniculate, the lower pair of bracts usually somewhat distant from the upper ones.—Nevada, (H. Engelmann.) Southern Utah, (Palmer.)

## CONIFERÆ.

PINUS MONOPHYLLA, Torr. *DC. Prodr.* 16. 2. 378. A low tree of rather open rigid habit, the branches spreading or subdeflexed; bud-scales broad-ovate, acute or obtuse, spreading or appressed, light-brown, persistent, more obtuse and spreading on the barren shoots; sheaths short, light-brown, soon lacerate and revolute; leaves solitary, terete, short, 1–2½′ long and ¾″ in diameter, rigid, straight or subcurved, mucronate and pungent, smooth, glaucous, very rarely in pairs and semi-cylindric; staminate aments numerous in a short (½–1′) spike, 2–3″ long, oblong, obtuse, crests of the anthers dilated, semi-orbicular, entire; cones 2–2½′ long, 1¾′ broad, ovate, sessile, the scales smooth and shining, obovate, cuneate, 1′ long, 10–12″ wide, the apophysis pyramidal, 3–4-sided, recurved, with a truncate and depressed summit; nuts oblong, ½′ long and 3″ in thickness, somewhat angled, light-colored, rather thin, wingless, the bracts small, becoming 2–3″ long, thin and free.—On the eastern slope of the Sierras and eastward, and reported from the Cascade Mountains, Oregon. Frequent on many of the ranges of Nevada from the Sierras to the East Humboldt Mountains, at 4,500–7,000 feet altitude, growing 10–20° high, rarely 1° in diameter. For the first 2–3 years from the seed, the leaves are very short and lance-linear, subflattened, carinate and caniculate, sheathless. The allied *P. edulis*, Eng., which is found from Colorado to New Mexico and Arizona, is said to grow 30–50° high, the leaves in threes or in pairs, shorter, and the cones but half as large as in *P. monophylla*. (1,109.)

PINUS CONTORTA, Dougl. *DC. Prodr.* 16. 2. 381, in part. (*P. Bolanderi*, Parl., *DC.*, *l. c.*, 379.) A low tree, 10–30° high; bud-scales lanceolate, acute, sublacerate; sheaths short; leaves in pairs, 1–2′ long, numerous, rigid, erect-

spreading, semi-terete and deeply-channeled, mucronate and subacute, scarcely roughish on the margin; cones 1–4, verticillate, 1–2′ long, 10–15″ wide, ovoid, subobtuse, straight or curved, persistent; scales 3–4″ wide, with a shining pyramidal 4-sided summit, the transverse ridge acute, mucronate with a deciduous straightish or incurved spine.—On the coast from Northern California to Sitka. Var. LATIFOLIA, Eng., *in litt.* The mountain form, with broader leaves, extending eastward to Colorado, and said to attain a height of 40–60°. It was seen only in the Uintas, at an altitude of 7–8,000 feet, not over 20° high, rather slender, with a somewhat scaly grayish-brown bark; known as "Red Pine." The specimens show numerous sessile sterile aments, 4–5″ long, the anther-crest semi-orbicular with a torn or irregular margin. The mucro upon the scales of the cones is frequently 1½″ long; bracts persistent, thickened; seed 2″ long, oval, dark-colored, wing 3 times longer. (1,110.)

PINUS PONDEROSA, Dougl. *DC. Prodr.* 16. 2. 395. Tall, with wide-spreading or subpendulous branches; bud-scales lanceolate, acuminate; sheaths rather long; leaves in threes, usually long, 4–10′, and ¾–1″ broad, clustered at the ends of the stout and rigid branchlets, erect or spreading, rather rigid, scabrous on the margin, somewhat sharply mucronate; sterile aments numerous, fascicled, cylindrical, with suborbicular crenate-dentate crests; cones usually 3–4, short-peduncled and subpendulous, 3–6′ long, 1½–2′ wide, conic or conic-cylindric, straight; scales 1–1½′ long, 6–9″ wide, the subrhombic summit elevated, radiately cracked, the transverse ridge acute, the mucro stout, sharp, and recurved; bracts persistent, thickened; seed oval, 3–5″ long, the wing oblong, obtuse, 1′ long.—New Mexico to California, and northward to Colorado and Washington Territory. Washoe Mountains, Nevada, and in the Uintas; 5–8,000 feet altitude; known as "Yellow Pine." Bark light-red, yellowish-brown within, thick, cracking irregularly and cleaving into small very irregularly shaped scales. The sterile aments are described as 1′ long or more; none of those in the collection exceed half an inch. (1,111.)

PINUS BALFOURIANA, Murr. *Gordon's Pinetum, p.* 217. A middle-sized tree, with pendulous or spreading branches, often short and twisted; bud-scales oblong-lanceolate, acuminate, persistent; sheaths of numerous oblong fringed scales, soon squarrose or caducous; leaves mostly in fives, densely crowded and often covering the branches, long-persistent, 1–1½′ long,

stout and rigid, erect, curved, triangular, smooth, obtusely mucronate, the inner faces striate; sterile aments clustered, ovate, the anther-crest reduced to 1–2 small protuberances; cones 3–5′ long, 1–1½′ wide, terminal and mostly solitary, ovate-oblong, obtuse, "dark-brown;" scales 4–6″ wide, with a rhombic slightly elevated summit, the transverse ridge acute, the umbo small, mucronate with a straight ascending awn; seed 3″ long, with a rather broad obtuse elongated wing.—Northern California, (Jeffrey.) Found only on the summit of the East Humboldt Mountains, Nevada, at 9–10,000 feet altitude, a few scattered trees of strict contracted habit, with thin light-gray bark, smooth on the branches, which were covered by the short crowded leaves; cones 3–3½′ long, light-reddish-brown, with short awns. The Colorado form, (*P. aristata*, Eng., which has been identified with this species by Dr. Engelmann,) has smaller cones, 2–3′ long, dark-colored, the lance-subulate awn often 3″ long. (1,112.)

Pinus flexilis, James. *DC. Prodr.* 16. 2. 403. Middle-sized tree with mostly horizontal branches; bud-scales ovate, acuminate, subfimbriate; sheaths ½′ long, of several ovate and linear-oblong obtuse deciduous scales; leaves 1–3′ (usually 2′) long, ½″ wide, in fives, densely crowded at the ends of the branchlets, rigid, smooth, obtusely mucronate; sterile aments numerous, 3–5″ long, in a thick subterminal spike, the anther-crest small and irregularly incised-dentate, (or obsolete;) cones 3–4, oval-oblong to ovate-cylindric, 2½–5′ long, 1½–2′ broad, obtuse; scales very broad, (8–15″,) with a short-cuneate base, thick, pitted usually on both sides, the compressed summit terminating in the erect acute semi-circular transverse ridge and a sub-rhombic acutish umbo; seed 4–5″ long, 2½″ wide, pale-colored, with a rudimentary wing.—Bark rather thin, scaly, reddish or sometimes dark-gray. Rocky Mountains, from New Mexico to Washington Territory. The prevalent pine in the East Humboldt Mountains, Nevada, and frequent in the Wahsatch and Uintas; 6,500–11,000 feet altitude. The aged trees of the East Humboldt Mountains, often 250–500 years old and 2–3° in diameter, rarely 50° high, are too knotty and cross-grained to be valuable for timber. (1,113.)

Abies Engelmanni, Parry. (*Pinus commutata*, Parl. *DC. Prodr.* 16. 2. 417.) A tall pyramidal tree with horizontal branches; branchlets pubescent; bud-scales ovate, obtuse, squarrose; leaves crowded, 6–15″ long, rigid, compressed-tetragonal, abruptly and somewhat obtusely mucronate, very

minutely white-punctate; sterile aments 6–9″ long, anther-crests rounded, dentate-fimbriate; fertile aments 9–10″ long, dark-purple, the fleshy ovate obtuse squarrose scales scarcely exceeding the ovate-lanceolate bracts; cones solitary, about 2′ long, ¾′ wide, ovate-cylindric, obtuse, reddish-brown; scales thin, 6″ wide, obovate-rhombic, subtruncate or emarginate, erose; bracts 2–3″ long, ovate-oblong, obtusish, dentate; seed 1″ long; wing obliquely obovate, 2–3″ long.—Bark thin, (1½″,) scaly, reddish or purplish-brown; wood white and soft. Rocky Mountains, from New Mexico to Montana. East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 8–10,000 feet altitude: known as "White Pine." (1,114.)

Abies Menziesii, Lindl. (*Pinus*, Dougl. *DC. Prodr.* 16. 2. 418.) Tall, of strict conical growth, with spreading branches; branchlets light-colored, smooth and shining; bud-scales ovate, obtuse, the lowest pubescent, carinate and awned; leaves crowded, 6–12″ long, stout and rigid, compressed-tetragonal, very acute, minutely white-punctate; sterile aments 9–12″ long, thick, anther-crests subrounded, dentate; fertile aments 15–20″ long, with pale shining rounded scales, bracts minute; cones abundant, solitary or sub-clustered, drooping, 2½–5′ long, 12–15″ wide, light-brown, obtuse; scales thin, 5–7″ wide, oval or subrhombic, more or less elongated above, obtuse or sub-emarginate and erose-dentate; bracts small; seed 1–1½″ long, wing obovate-oblong, obtuse, 4–6″ long.—Bark 3–6″ thick, smooth and gray, with numerous vesicles, becoming in older trees very thick, hard and ridged; wood rather coarse-grained. From Sitka to California and Colorado. In the Wahsatch and Uintas; 7–9,000 feet altitude; known as "Balsam." As in the last the dried specimens are apt to lose their leaves, but the species may be distinguished at once from each other by the smooth or pubescent branchlets. (1,115.)

Abies amabilis, Forbes. (?) (*Pinus*, Dougl. *DC. Prodr.* 16. 2. 426.) Tall, pyramidal, with horizontal branches; leaves 6–12″ long, 1″ wide, closely crowded in 2 rows, subsecund, erect-spreading, rigid, curved or falcate, usually acutely mucronate, flat or somewhat channeled and dark-green above, strongly carinate and glaucous beneath; "sterile aments 3–4″ long, oval;" fertile ones 10″ long, subcylindric, the concave rounded long-cuspidate bract exceeding the rounded ciliolate scale, basal bracts numerous, ovate, obtuse, smooth; cones 4–6½′ long, 1½–2½′ wide, solitary, erect, cylindrical, obtuse, brownish-purple; scales 1′ long, 1½′ wide, horizontal and close-

pressed, abruptly short-unguiculate, the rounded upper margin subreflexed and pubescent, several times exceeding the rounded dentate often long-cuspidate bract; seed 5″ long, 3″ wide, obovate-cuneate, angled, the broad wing rounded above and nearly equaling the scale.—There has been much confusion between this and the following species. The specimens of the collection, however, appear quite clearly distinct from those referred to *A. grandis*, and agree essentially with Parlatore's description, who claims to have seen an original cone of Douglas', and with Newberry's account of the Cascade Mountain trees. They do not accord with the description of the New Mexican *A. concolor*, Eng. Reported from Washington Territory to Wyoming and New Mexico. In the Wahsatch Mountains, but not frequent; 7–9,000 feet altitude. (1,116.)

Abies grandis, Lindl. (*Pinus*, Dougl. *DC. Prodr.* 16. 2. 427.) Tall, pyramidal, with horizontal branches; leaves 6–18″ (usually 12″) long, 1″ broad, numerous, in 2 rows, spreading or erect, rigid, straight or curved, more or less contracted and twisted above the base, obtuse or emarginate, green and subsulcate above, strongly keeled and glaucous beneath; cones 2½′–3½′ long, 1½–2′ wide, solitary, erect, oblong, obtuse, greenish; scales 7–10″ long, 9–12″ broad, horizontal and close-pressed, broad-cuneate and unguiculate, the rounded upper margin subreflexed and usually resinous-pubescent, much exceeding the obcordate toothed short-mucronate bracts; seed 3′ long, 2″ wide, obovate-cuneate, angled, wing nearly equaling the scale, somewhat 4-sided.—Bark rather thin, pale-gray or brownish; wood fine-grained and tough. From Washington Territory to California and Colorado. In the Washoe Mountains, Nevada, where it is known as "White Spruce," and in the Goose Creek, Wahsatch and Uinta Mountains, Utah; 6–8,000 feet altitude. As is true of the last species, the seeds are a favorite food of squirrels, so that it is frequently difficult to procure perfect cones, though there may be bushe of scales heaped under the trees. (1,117.)

Abies Douglasii, Lind. (*Pinus*, Sabin. *DC. Prodr.* 16. 2. 430.) Tall, pyramidal, with horizontal drooping branches; bud-scales spatulate, fimbriate above; young branchlets pubescent; leaves 6–18″ (usually 1′) long, ½″ wide, numerous, sub-2-rowed, spreading, straight or curved and rather rigid, flattened, contracted and somewhat twisted above the rounded base, sulcate above and sub-carinate beneath, obtuse or acutish; sterile aments 6–8″ long, approximate, the anther-crests short-lanceolate, erect; fertile aments purple, the

lobed foliaceous bracts long-exserted, usually reflexed; cones 1½–4′ long, 1–1½′ wide, somewhat clustered, pendulous, obtusish, scales concave, rounded, entire, pubescent; bracts long-exserted, bifid, the acuminate suberose-dentate lobes shorter than the cuspidate midnerve; seed 3″ long, acutely margined, a little shorter than the oblong obtuse wing.—Bark rather thin, ash or reddish-gray; wood coarse-grained, but tough and hard. From Washington Territory to Southern California, and in the Rocky Mountains to Colorado and New Mexico. In the Uintas; 7–9,000 feet altitude; known as "Bear River" or "Swamp Pine." (1,118.)

Libocedrus[1] decurrens, Torr. *DC. Prodr.* 16. 2. 456. Tall, with spreading branches and green flattened distichous alternate glabrous branchlets; leaves 1–5″ long, adnate, the ovate sharp-mucronate apex only free, the marginal leaves scarcely longer; sterile aments 2–2½″ long, oval, erect, anthers 3, with rounded subentire crests; cones 8–12″ long, erect or pendent, ovate-oblong, cinnamon-color; scales 6, the lower usually very much shorter, ovate or oblong, rounded at the apex, the middle pair 3–5″ wide, oblong, convex, equaling the narrowly linear upper ones; seed 4–6″ long, oblong, wings often confluent, very narrow on the outer margin, obtuse, equaling the scales.—California and Southern Oregon, especially in the Sierras. Washoe Mountains, above Carson City, Nevada; 7,000 feet altitude. (1,119.)

Juniperus communis, L., Var. alpina, L. From Maine and the Great Lakes throughout Northern America to the Arctic Ocean and Greenland; southward in the mountains to Washington Territory and Colorado. East Humboldt Mountains, Nevada; 9–10,000 feet altitude. As is often the case the leaves appear decurrent on the stem below the articulation, bearing conspicuous vesicles filled with resin. (1,120.)

Juniperus Virginiana, L. From Florida to California, and northward to Canada, the Saskatchewan and Oregon. Rare in the East Humboldt

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[1] LIBOCEDRUS, Endl. Flowers monœcious on different branches, sometimes diœcious. Aments solitary, terminal; sterile ones cylindric, or ovate and subtetragonal. Stamens decussately opposite, with subpeltate crests, and each with 3–4 longitudinally dehiscent anthers on the dorsal side. Fertile aments bracteate, with 4–6 decussately opposite erect scales, the lower pair usually sterile, the third when present connate into a longitudinal septum. Ovules 2, flask-shaped. Cone ripening the first year; scales subwoody, mucronate below the apex, erect, at length spreading. Seeds in pairs or solitary, erect, oblong, the membranous wing nearly equaling the scales, inequilateral. Embryo axial and as long as the fleshy albumen; cotyledons 2; radicle cylindric, superior.—Evergreens, with smooth bark and light-colored close-grained wood; branches scattered; leaves decussately opposite, imbricated by fours and scale-like, dissimilar, the facial ones smaller, flat and appressed, often glandulose, the marginal ones bract-like and carinate, glandless.

Mountains, Nevada; also found in the Raft River Mountains, and frequent in the Wahsatch; 6,000 feet altitude. (1,121.)

Juniperus occidentalis, Hook. *Fl. Bor. Amer.* 2. 166. *DC. Prodr.* 16. 2. 489. A monœcious spreading shrub or tree, 10–40° high, with loose reddish bark, the branches scattered, spreading, horizontal, or drooping; branchlets terete, covered with leaves; leaves in threes, scale-like, closely imbricate and appressed, ovate, acute, convex on the back and marked between the middle and the base with an oblong gland, finally on the older branchlets becoming somewhat free and slightly spreading with an acute mucronate subpungent apex, (on rapidly growing shoots often less crowded, decurrent at base, the apex free and pungently long-acuminate;) sterile aments 2–3″ long, erect, oval, rounded or subquadrangular, scales orbicular, rather flat on the back and glandular, entire; fruit erect on short branchlets, solitary, numerous, oval or obovate-globose, rather large (4–5″ in diameter,) green and glaucous, becoming reddish-brown, of 6 or rarely 9 scales, with a short obtuse somewhat spreading or reflexed apex; seeds 2–1, ovate, acutish, pale and somewhat shining, 2–3 times larger than in *J. Virginiana.*—Wood white, the innermost heart-wood red. From Western Texas to California and Oregon. Abundant throughout Nevada, though rarely over 10 or 15° high, sometimes 1° or more in thickness at base; not seen in Utah, nor is it reported from Colorado; 4,500–7,000 feet altitude. These three species probably include all the forms found west of the Mississippi. (1,122.)

## LEMNACEÆ.

Lemna trisulca, L. Northern States and Canada; the Saskatchewan region; California; New Mexico. Nevada and in the Uintas; 5,500–6,000 feet altitude. Minutely puberulent and occasionally with short scattered hairs above; mostly rootless, sterile. (1,123.)

Lemna Valdesiana, (?) (*L. Torreyi*, Aust.) Perhaps a thick and rootless form; found growing with the last at Summit Springs, near Battle Mountain, Nevada; 5,500 feet altitude; June. Barren. (1,124.)

Lemna minor, L. From Florida to Canada and westward; Arkansas; California; Arizona. Truckee and Goose Creek Valleys, Nevada; 4–6,000 feet altitude. July, in flower; September. (1,125.)

Lemna polyrrhiza, L. From Florida to New England and the Saskatchewan; Arkansas; Texas. Truckee River, Nevada; 4,000 feet altitude; barren. (1,126.)

## TYPHACEÆ.

Typha latifolia, L. From Florida to Canada, northward to the Arctic Circle and west to Oregon and California. Frequent in Humboldt Valley, Nevada, and in Salt Lake Valley; 4,500 feet altitude. (1,127.)

Sparganium eurycarpum, Eng. From New England and Pennsylvania to Canada, Great Slave Lake and the Missouri River. On the Humboldt River, Nevada, and on the Jordan, Utah; 4–4,500 feet altitude. (1,128.)

Sparganium minimum, Bauh. From Northern New England, Pennsylvania and Wisconsin to Canada, Newfoundland and Labrador; in the Rocky Mountains, latitude 58°, (Drummond;) Unalaska and Behring Strait. Bear River Cañon, Uintas; 8–10,000 feet altitude; August. (1,129.)

## NAIADACEÆ.

Zannichellia palustris, L. From Western Florida to New York, Ohio and the Saskatchewan; on "the Plains," (Hall;) from Western Texas to Sonora, and northward on the Pacific Coast to the Columbia. Found in Parley's Park in the Wahsatch; 6,000 feet altitude; July. (1,130.)

Potamogeton[1] natans, L. Common in the Northern States and to Canada, Hudson's Bay, Minnesota and the Saskatchewan; reported also from Arkansas, Texas, Northern Mexico, Northern California and Sitka. Collected in Ruby Lake, Nevada, and in Weber River, Utah; 6,000 feet altitude; August. (1,131.)

Potamogeton rufescens, Schrad. From New England to Pennsylvania and Illinois and northward to Hudson's Bay; Unalaska. Found (the submersed form) in the Uinta Mountains, on Bear River; 8,000 feet altitude; August, scarcely in flower. (1,132.)

Potamogeton lonchites, Tuck. New England to Illinois; Texas, (Drummond.) Humboldt Pass, Nevada, near the head of Humboldt River; 6,000 feet altitude; September, scarcely out of flower. (1,133.)

Potamogeton gramineus, L., Var. heterophyllus, Fries. North Carolina, and common northward to Canada, Hudson's Bay and the Saskatchewan; Arkansas, (Nuttall.) Ruby Lake, Nevada; 6,000 feet altitude; August, in flower. (1,134.)

Potamogeton perfoliatus, L., Var. lanceolatus, Robbins. The spe-

[1] The determinations and notes under this genus are due to Dr. J. W. Robbins.

cies ranges from Florida to Canada and the Slave River; the variety occurring along the Great Lakes. On the Truckee River, Nevada; 4,000 feet altitude; July, in flower. (1,135.)

Potamogeton pusillus, L., Var. vulgaris, Fries. (?) Differing from the ordinary form, especially in the revolute and consequently subulate form of the leaves produced by desiccation, resembling in this respect *P. cæspitosus*, Nolte. The species is reported from the Northern States to Canada, Hudson's Bay and the Saskatchewan. Bear River, in the Uintas; 8,000 feet altitude; August, in fruit. (1,136.)

Subvar. interruptus, Robbins. Leaves less rigid and taper than in the last, and with the midrib veiny. Parley's Park in the Wahsatch; 6,000 feet altitude; July, in flower and fruit. (1,137.)

Potamogeton pectinatus, L. The typical form; the apex of the embryo little incurved. Western Florida and along the coast northward; from Lake Champlain to Wisconsin, through Canada to Hudson's Bay, and westward to the Rocky Mountains, (Drummond;) Oregon, (Scouler;) Colorado; California; New Mexico (Wright) and Sonora. In still brackish water in Thousand Spring Valley, Nevada; 6,000 feet altitude; September, in fruit. (1,138.) A doubtful form, the whole plant and especially the peduncles unusually slender, was also found in the Humboldt River, near its sink, in brackish running water; 4,000 feet altitude; August, scarcely in flower. (1,139.)

Var. With sparse long and rather broad (⅜″) leaves. In a cold freshwater stream in Ruby Valley, Nevada; 6,000 feet altitude; July, with immature fruit. (1,140.)

Var. Leaves 3-nerved, still broader and longer, intermediate between the last form and the following one. In the Lower Humboldt River, with the doubtful form above; barren stems. (1,141.)

Var. (?) latifolius, Robbins. Stem thicker; leaves numerous, short (1–2′,) flat, broad (1–2″,) 3–5-nerved, reticulate with many cross-veins, older ones obtuse, the younger acute or acuminate; sheaths large, many-nerved, with scarious margins; stipules scarious, obtuse, shorter than the sheaths; peduncles short (1–3′;) fruit slightly smaller, somewhat corrugated when dry; style long; embryo more incurved.—Agreeing sufficiently well with the brief specific character given by Fries to his *P. zosteraceus*, but it differs essentially from parts of his detailed description, ("Planta ingens longissima; folia siccata nigrescentia; ligula elongata demum fissa; pedunculus longissi-

mus, (spike 8–10′ long, *Reich.*,) verticillis longe distantibus,") and from Reichenbach's figure. Its habitat, moreover—"in alto maris," Sweden—renders its identity with our plant improbable. On the other hand, some of the broader leaved forms from our Great Lakes, to which the first variety above closely approximates, and especially the last variety by its 3-nerved leaves, seem to indicate a transition from the narrow-leaved typical form of *P. pectinatus* to the present plant. Found in the running brackish waters of Humboldt River below Humboldt Lake; 4,000 feet altitude; August, in fruit. (1,142.)

POTAMOGETON MARINUS, L. Resembling *P. pectinatus*, but with the much smaller fruit obovate-subglobose, corrugated when dry, not keeled upon the broad-rounded back, crowned with a broad sessile stigma. (*Koch.*)—Central Europe, mostly in sea-water. Var. (?) OCCIDENTALIS, Robbins. Stems 2½° long, slender, branching, less leafy than in *P. pectinatus;* leaves flat or canuliculate, the larger ½″ broad and 3′ long, 1-nerved with few transverse veins, obtuse, the smaller nearly setaceous; larger sheaths about 1′ long, with few nerves; stipules white-scarious, as long as the sheaths; peduncles filiform, sometimes 6′ long; spikes interrupted, with about 4–6 flowers; fruit minute, roundish-obovate and with a sessile subapical stigma, the denuded nutlet with its keels more distinct, the sides uneven by a central elevation partially surrounded by a shallow depression, which is margined by the raised lateral keel; embryo forming a large circle, its apex directed toward its base.—Approaching *P. pectinatus* in habit and differing widely from the small Linnæan form of *P. marinus*, (*P. filiformis*, Nolte.) But the fruit, while scarcely one-fifth as large as that of the former, is in size and form like that of the latter except in its more acute keel and uneven sides. Found in the fresh waters of Ruby Lake, Nevada, with *P. natans* and *P. gramineus;* 6,000 feet altitude; August, in fruit. (1,143.) Specimens with immature fruit collected in the Uintas, near the head of Bear River, probably belong to the same form; in fresh water at 8,000 feet altitude; August. (1,144.)

Also very early specimens collected with *P. perfoliatus* in fresh water in the Truckee Pass, Nevada, may belong here rather than with *P. pectinatus*, though with thickish spikes; 4,000 feet altitude; July. About 3° long, with longer leaves sometimes 9′ in length, and with marginal nerves, on close long (1–2′) sheaths, and with shorter (2′) peduncles, and spikes of 8–10 flowers. (1,145.) A very attenuated delicate form, not yet in flower, col-

lected in the brackish waters of the Lower Humboldt, with *P. pectinatus?* (1,139 and 1,141,) may also rather belong here; August. (1,146.)

## ALISMACEÆ.

Triglochin palustre, L. From New York and Pennsylvania to Illinois; Labrador; on the Saskatchewan; Colorado, (Hall & Harbour;) Sitka. Jordan Valley, near Salt Lake City. (1,147.)

Triglochin maritimum, L. Northern States to Labrador and the Arctic Circle, and westward to Sitka, Oregon and California, Utah and Colorado. Frequent in alkaline and saline marshes and meadows through Nevada and Utah; May–July. 1–3° high; capsules varying from oval to narrow-oblong, more or less winged. (1,148.)

Alisma Plantago, L., Var. Americanum, Gray. From Georgia to Canada and the Saskatchewan, westward to Arkansas and the base of the Rocky Mountains; Northern California to Washington Territory. On the Truckee River. (1,149.)

Var. With very narrow leaves, 3–6″ wide, attenuate at base into a petiole 4–6′ long. (1,150.)

Sagittaria variabilis, Eng. From Newfoundland to Florida and west to Texas, New Mexico, Northern California and the Saskatchewan. On the Truckee River and Lake Washoe, Nevada, and in Salt Lake Valley. Uniformly with broad sagittate leaves, 2–6′ long, the width equaling half the length or more. (1,151.)

## ORCHIDACEÆ.

Habenaria hyperborea, Br. From the northern Border States and Canada to Greenland, the Arctic Circle and Unalaska, in the Saskatchewan region and Washington Territory, and southward in the mountains to California (?) and Colorado. Ruby Valley, Nevada, and in cañons of the Wahsatch and Uintas; 4,500–8,000 feet altitude; July, August. 1–3° high; spikes usually rather loosely flowered, 4–18′ long; flowers smaller than in any of the allied species, more or less greenish, the posterior sepal somewhat hooded at the apex, broadly ovate, 1½–2″ long, 1–1½″ broad; lateral sepals somewhat longer and narrower, 2–2½″ long, ¾–1″ wide; petals smaller, 1½–2″ long, ½–¾″ wide; lip narrow-oblong, usually but slightly broader toward the base, 2–3″ long, 1″ broad; spur 2–3″ long. (1,152.)

Habenaria dilatata, Gray. Very near the last, but probably distinct;

habitat the same. Found in the Toyabe, East Humboldt and Clover Mountains, Nevada; 6–9,000 feet altitude; July–September. Height and habit much as in the last; flowers somewhat larger, nearly white; posterior sepal not at all hooded, (2 by 1½″;) lateral sepals and petals 2½″ long by 1″ wide; lip somewhat broadest toward the base, 3″ long, 1″ wide; spur 3–4″ long. (1,153.)

Var. Flowers larger and spur much elongated; posterior sepal 2½ by 1½″, lateral ones and petals 2–3″ long by 1–1½″ wide; lip 4″ long, usually auriculate at base, occasionally oblong, (2″ wide;) spur 6″ long.—In the East Humboldt Mountains and in the Wahsatch; 6–7,000 feet altitude. (1,154.)

Habenaria fœtida. (*Platanthera*, Gey., Ms.) Slender, 8–18′ high, glabrous; leaves 3–4, sheathing the base of the stem, 3–7′ long, oblong or narrow-lanceolate, subacute; stem with a few scattered small oblong-lanceolate acuminate bract-like leaflets; spike elongated, 4–8′ long, loosely-flowered; bracts ovate, subacute, rather shorter than the ovary; flowers white, small; sepals 1–1½″ long, oblong-obtuse, 1-nerved, spreading; petals and lip somewhat fleshy, the former oblanceolate, obtusish, the latter oblong, entire; spur 1–1½″ long, shorter than the ovary; anther-cells adnate, diverging, broad and obtuse at base.—534 Geyer, and also collected by Lyall in the Cascade Mountains, 1859, and on the West Kootanie, 1861. *H. elegans* differs especially in its much denser spike and much longer filiform spur. Wahsatch and Uintas; 8–9,000 feet altitude; July, August. (1,155.)

Spiranthes Romanzoffiana, Cham. From Maine and Canada to Lake Superior, the Saskatchewan and Washington Territory, northward to Unalaska and south to California and Colorado; collected by Torrey near Lake Washoe, Nevada. East Humboldt Mountains and Uintas; 6–8,000 feet altitude; July–September. (1,156.)

Listera convallarioides, Hook. Maine to Pennsylvania and Lake Superior, Canada, and west to the Rocky Mountains; Unalaska. East Humboldt Mountains; 7,000 feet altitude; August. (1,157.)

Epipactis[1] gigantea, Dougl. *Hook. Fl. Bor.-Amer.* 2. 202, *t.* 202.

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[1] EPIPACTIS, Hall. Flowers pedicelled. Sepals and petals spreading, similar, nearly equal. Lip oblong, free, interrupted, the upper portion concave and fleshy, the lower petaloid, dilated, undivided, callous at base. Column terete or flattened anteriorly, straight, fleshy; stigma square, projecting downward. Anthers posterior, cordate, pointless, seated upon the truncate apiculate stigma. Pollen-masses powdery, 2-parted, narrowed at the apex.—Herbs, with a subterranean creeping rootstock; leaves plicate, cucullate at base; flowers loosely spicate, semi-herbaceous, usually purplish, pubescent.

Tall, 2–3° high, leafy; leaves ovate- or narrow-lanceolate, 5–8′ long, scabrous on the margin, the lower sheathing and very obtuse, the others long-acuminate; flowers greenish-brown, solitary, axillary, nodding, the lip, sepals and petals all acuminate.—Washington Territory and Idaho to California, New Mexico and Western Texas, (Wright;) near Carson City, Nevada, (10 Anderson.) Shore of Soda Lake in Carson Desert; 4,000 feet altitude; August. (1,158.)

Corallorhiza multiflora, Nutt. Northern States and Canada, and on the Western Coast from Washington Territory to California. Found in the Wahsatch above Parley's Park, rare; 7,000 feet altitude; July. Sepals and petals strongly veined; middle lobe of the purplish lip broad and rounded, twice longer than the subacute lateral ones. (1,159.)

## IRIDACEÆ.

Iris Tolmieana, Herb. *Bot. Beechey*, 1. 396. Stem tall, 1–2° high, slender, solid, terete, naked or with a single leaf near the base, simple, 2–4-flowered; leaves narrow, 3″ wide, erect, acute, purple at base, shorter than the stem or about equaling it; spathe 2-valved, acute, 2′ long; flowers on slender peduncles, ½–2′ long, pale-blue, beardless and crestless; tube short (3–4″) above a very short (1″) solid base; sepals 2½′ long, exceeding the (2′) petals; stigmas 2-lobed, somewhat dentate at apex, shorter than the petals; capsule oblong, 1½′ long, ½′ wide, hexagonal.—On the Willamette, Oregon, (Tolmie;) Northern California, (? Newberry;) also Ruby Valley, Nevada, (Beckwith,) referred to *I. longipetala.* Rather frequent in the high valleys from the Pah-Ute to the East Humboldt Mountains, Nevada; 6,000 feet altitude; June–August. (1,160.)

Sisyrinchium Bermudiana, L. Varying from Var. *anceps* to *mucronatum*, the two forms sometimes collected together; stems 4–15′ high; perianth 3–6″ long. Throughout the United States and north to the Arctic Circle. Collected by Anderson near Carson City, and not rare, especially in high valleys, from the Shoshone and Toyabe Mountains eastward to the Wahsatch and Uintas; 4,500–8,000 feet altitude; May–August. (1,161.)

Sisyrinchium grandiflorum, Dougl. Stem 8–18′ high, strict, compressed, longer than the erect sheathing leaves; spathe 1–3-flowered, about equaling the often nodding peduncles; perianth large, 6–10″ long, bright-purple, broadly campanulate; filaments very long, subulate, connate only at

the contracted base, erect, at length spreading.—Washington Territory to Northern California. Collected by Beckwith in the Stage Pass of the East Humboldt Mountains, Nevada.

## LILIACEÆ.

ZIGADENUS GLAUCUS, Nutt. From Northern New York, the Great Lakes and Upper Canada to the Saskatchewan, Great Bear Lake and Behring Strait, and southward in the mountains to California, Colorado and New Mexico, (Fendler.) In Ruby and Huntington Valleys and in the East Humboldt and Uinta Mountains; 6–9,000 feet altitude; August. Only a slender form, 1–2° high, with a loose few-flowered somewhat panicled raceme, the leaves narrow, not exceeding 3″ wide; sepals 3–4″ in length, 1½–2″ wide. (1,162.)

ZIGADENUS FREMONTII, Torr. (*Anticlea*, Torr. *Pac. R. R. Surv.* 4. 149. *Z. Douglasii*, Torr. *Pac. R. R. Surv.* 7. 20.) Collected by Frémont on the Uinta River, Utah, and found from California to Washington Territory. Scarcely distinguishable from the last, except by its more obscure gland occupying the base of the petal and extending upward along the nerves, but not so far as the well-defined 2-lobed summit of the gland in *Z. glaucus.*

ZIGADENUS NUTTALLII, Gray. (*Amianthium Nuttallii*, Gray, Var. *α. Ann. N. Y. Lyc.* 4. 123.) Bulb tunicated; stem 8–20′ high, slender, with several elongated narrowly linear bracteiform leaves, which are semi-amplexicaul or the lower slightly sheathing; lower leaves 2–4″ wide, folded-carinate, usually shorter than the stem, rough on the margin; raceme simple, usually very short, 1–3′ long, rarely 10′; flowers crowded, bracteate, on slender elongated pedicels; lower bracts usually foliaceous, the upper membranous; sepals 1½–3″ long, ovate-elliptical, very obtuse, abruptly narrowed and slightly glandular at base; ovary-cells 12–14-ovuled; capsule oblong-ovate, 6″ long; seeds 2½″ long, oblong.—Always growing in meadows or on stream-banks, the raceme always simple. Bulb about ½′ in diameter or larger; coatings often marked by numerous white raphides. From Arkansas and Texas to California and Oregon. Havallah and Battle Mountains and Ruby Valley, Nevada, and in the Wahsatch; 6,000 feet altitude; flowering late in June and in July. (1,163.)

ZIGADENUS PANICULATUS. (*Helonias*, Nutt. *Amianthium Nuttallii*, Gray, Var. *β.*, *l. c.*) Stem rather stout, 15–30′ high, somewhat leafy; leaves sheath-

ing at base, (even the 1–2 uppermost bract-like ones,) broad-linear, 4–8″ wide, rough-margined and roughish-puberulent on both sides, folded-carinate and mostly falcate; raceme panicled, many-flowered, the lower branches spreading, short, the terminal ones elongated, (3–10′;) flowers on slender pedicels, often sterile and short-pedicelled in the lower racemes; bracts membranous; sepals 1–2″ long, oblong, abruptly somewhat narrowed at base, the rather broad claw green and glandular; ovary-cells about 10-ovuled; capsule oblong-ovate or oblong, ½–1′ long; seeds 3–5″ long, oblong.—An examination of numerous specimens leaves no doubt of the distinctness of these two species. Bulb as in the last, but usually larger, the whole plant stout, growing on dry foot-hills, and in flower a month earlier. The root of neither species is eaten by the Indians. Oregon and Washington Territory. Frequent on the foot-hills of the Virginia, Trinity and West Humboldt Mountains, Nevada, and in the Wahsatch; 5–6,000 feet altitude; May, June. (1,164.)

VERATRUM ALBUM, L. Raceme panicled, pubescent; bracts at the base of the branches oblong; pedicels much shorter than the calyx; sepals oblong, rather obtuse, somewhat fimbriate-denticulate, spreading; leaves plicate, the lower elliptical.—Flowers numerous in a rather close strict panicle, ochroleucous with a darker green or brownish base; segments 4–5″ long, oblong, attenuate at base; branchlets of the panicle tomentose; leaves varying from lanceolate to nearly orbicular; 3–5° high. Collected by Parry in the Middle Park, Colorado, and by Anderson (105) near Carson City, Nevada. The specimens of Wright's collection from Ochotsk Sea are somewhat less tomentose and the sepals more deeply denticulate. *V. Californicum*, Dur., is only rather more loosely panicled. The Oregon and Alaska form has greenish flowers, with the branches of the panicle elongated and drooping, and is *V. Eschscholtzii*, Gray, and nearly *V. Lobelianum*, Banks., which is *V. album*, β., Cham. & Ledeb. The eastern *V. viride* seems to differ only in the green herbaceous perianth, the segments perhaps rather less attenuate at base, the panicle more open and with longer branches. East Humboldt Mountains, Nevada, and in the Wahsatch; 6–9,000 feet altitude; June–September. (1,165.)

PROSARTES[1] TRACHYCARPA. Stem 1–1½° high, glabrous or pubescent;

[1] The characters of the fruit aid much in determining the species of this somewhat confused genus. Most of the western forms have been referred to *P. Hookeri*, Torr. This species is more or less roughish-pubescent, the leaves deeply cordate and clasping, very scabrous upon the margin; flowers greenish, usually truncate at base, the sepals broad-lanceolate and rather obtuse, about equaling the

branches 1–3- (usually 2-) flowered; leaves 2–4′ long, 1½–2′ broad, ovate, acute or subacuminate, obliquely subcordate at base, more or less clasping or often scarcely sessile, not punctate, glabrous or subpubescent, scarcely scabrous upon the margin or somewhat ciliate; perianth nearly white, subacute at base; sepals 3–6″ long, narrowly lanceolate, acute, but slightly glandular or gibbous at base; stamens about equaling the sepals, anthers linear-oblong, glabrous, 1¼″ long, or sometimes but ½″ long and upon much shorter filaments; style glabrous, deeply 3-cleft or rarely nearly entire; ovary rounded; ovules 4–6 in each cell; berry 4–6″ in diameter, light-red, subglobose-triangular, depressed and strongly 3-lobed, 8–12-seeded, rough-papillose.—The ovules are funiculated, horizontal or subascending. Collected by Parry in Colorado, (1862,) by Lyall in Washington Territory, and also by Wilkes (616, in part.) Wahsatch and Uintas; 6–9,000 feet altitude; May–August. (1,166.)

Streptopus amplexifolius, DC. Pennsylvania and northward to Newfoundland, Labrador, Hudson's Bay and the Saskatchewan; on the western coast from Sitka to Washington Territory, and in the Rocky Mountains to New Mexico. Wahsatch and Uintas; 8–9,000 feet altitude; July. (1,167.)

Smilacina racemosa, Desf., Var. amplexicaulis. (*S. amplexicaulis*, Nutt. *Jour. Acad. Phil.* 7. 58.) Leaves closely sessile and amplexicaul, shortly acuminate or only acute; style at least half as long as the ovary and equaling the stamens.—Distinguished at once from the usual form by its less acuminate sessile leaves and longer style and filaments. It is 2012 Hartweg and 353 Bridges from California, and 845 Fendler from New Mexico; collected also by Wyeth and Lyall in Oregon and Washington Territory and by Bourgeau in the Rocky Mountains. 728 Coulter from California, Lyall's specimens from Lower Fraser River and Bourgeau's from the Winnipeg are the typical form, which extends southward to Southern California, New Mexico, and the upper districts of the Gulf States. Clover Mountains, Nevada, and the Wahsatch; 6–7,000 feet altitude; May–September. (1,168.)

Smilacina stellata, Desf. Northern States, Labrador, Canada, and west to the Saskatchewan and Washington Territory; south to California

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stamens; style entire; fruit 3–4″ in diameter, globose-triangular, with a very short obtuse beak, glabrous, the cells 2-seeded.

*P. trachyandra*, Torr., collected only in flower, has the anthers slightly pubescent, the style entire, and ovary smooth. Fruiting specimens from Mendocino County, California, (Kellogg,) are probably the same; stem pubescent; leaves sessile, slightly cordate, long-acuminate, dark-green and shining, margins smooth; fruit smooth, 4–8″ long, ovate, short-attenuate at each end and somewhat beaked above; cells 2–4-seeded.—There are other undescribed Californian species.

and in the mountains to Colorado, New Mexico, and Arizona. On the banks of the Truckee and in mountain cañons of Nevada and the Wahsatch; 4 7,000 feet altitude; May–October. 1–3½° high, the larger specimens with leaves 8′ long and 1½′ wide; berries 3–5″ in diameter. (1,169.)

Polygonatum giganteum, Dietr. Northern States; on the Winnipeg and Saskatchewan; Montana, (Suckley;) also collected by Stansbury, but the locality uncertain.

Lilium parvum, Kell. *Trans. Calf. Acad.* 2. 179, *t.* 52. Stem 1½–2½° high; lower leaves verticillate, the upper scattered, 2–3′ long, lanceolate, acute or acuminate, 3-nerved, somewhat roughened beneath and upon the margin; the ciliate bracts 5–7-nerved; flowers rather small, verticillate by threes and alternate above, long-peduncled, erect or suberect, oblong-campanulate, the sessile sepals 1–1½′ long, revolute above the middle, red and somewhat spotted.—California and Nevada, (Dorr.) Specimens in Herb. Gray., which probably belong to this species, (10 Anderson from near Carson City, 526 Torrey from Donner Pass, and 351 Bridges from California,) are perfectly smooth, the stems 1–25-flowered, the flowers all scattered (or the lowermost subverticillate) and each peduncle subtended by a single bract. It should probably be considered but a variety of *L. Canadense*, which appears to assume several forms upon the western coast.

Fritillaria[1] atropurpurea, Nutt. *Jour. Acad. Phil.* 7. 54. Stem 4′–2° high, from a flat circular bulbiferous root, 1–9-flowered; leaves linear, 1½–4′ long, 1–2″ wide, scattered or the lower ones rarely in a whorl, obtuse or acute; flowers on ½′ peduncles, dark-brown, variegated with greenish-white or yellow; sepals 5–9″ long, subrhombic-lanceolate and spreading; filaments filiform; anthers oblong; stigmas widely recurved; capsule 6–12″ long, 5–9″ in diameter, hexagonal and 6-winged, truncate above and abruptly narrowed at base; seeds very numerous.—Stem and leaves usually tinged with brown

[1] FRITILLARIA, Tourn. Perianth regular, deciduous, of six distinct subequal sepals, campanulate-connivent, with an immarginate narrow nectariferous gland above the base of each. Filaments 6, subulate-filiform, adherent to the sepals only at base, subhypogynous. Anthers linear-oblong, attached anteriorly above the base to the filament, versatile, dehiscing longitudinally on the inner side. Ovary free, sessile, triangular, 3-celled; ovules numerous, in two rows, horizontal, anatropous. Style subclavately thickened at the apex, deciduous. Stigma trifid, (entire in *F. pudica*,) with linear canaliculately folded obtuse lobes. Capsule obtusely triangular, (6-angled in *F. Kamtschatcensis*, 6-winged in *F. lanceolata* and *atropurpurea*,) coriaceous, loculicidally 3-valved, without central columns and the valves introrsely ciliate on the margin. Seeds flat, broadly half-obovate, widely margined, cinnamon-brown, the thin membranous testa adherent to the albumen. Embryo very minute, oblong, straight.—Bulbous herbs, with simple leafy stems, racemosely 1–many-flowered; leaves sessile; flowers nodding, mostly tessellately variegated.

or purple. Collected by Wyeth in Montana. Frequent in the mountains through Nevada and in the Wahsatch; 5–9,500 feet altitude; May–August. (1,170.)

Fritillaria pudica, Spreng. *System.* 2. 64. Stem 3–8′ high, from a flattened disk-like bulbiferous corm, 1–6-flowered; leaves linear, 1½–4′ long, 2–3″ wide, obtuse, scattered; flowers deep-yellow, campanulate, often solitary, on rather long nodding peduncles, erect in fruit; sepals 5–9″ long, obovate-spatulate, sessile, the gland usually obscure; stigma entire; capsule 8–12″ long, oblong or subglobose, truncate above, abruptly narrowed at base; seeds very numerous.—From Washington Territory and Oregon to Montana and Utah. Washoe Mountains, near Carson City, Nevada, and in the Wahsatch; 5–6,000 feet altitude; April, May. (1,171.)

Calochortus[1] Nuttallii, T. & G. *Pac. R. R. Surv.* 2, (*Bot. Beckwith's Rep.*,) *p.* 124. Stem 6–20′ high, simple, 1–4-flowered, with 1–3 narrowly linear revolute leaves, 2–4′ long, the radical ones (1–few) longer (8–12′) and usually broader, (4″;) flowers on peduncles 1½–2′ long, in a terminal umbel, with an involucre of two or more sheathing leaf-like bracts; outer segments ovate-lanceolate, greenish with a scarious margin, often slightly colored and bearded within, and frequently nearly as long as the inner, which are dilated, (1¼–2′ long, 9–18″ wide,) obovate-cuneate, rounded-obtuse or abruptly pointed, white above with a tinge of green or purple, a small purple spot below the center, yellow and usually slightly bearded with long hairs toward the base around an oval or oblong gland, which is densely tufted with short hairs; anthers linear-oblong, 4″ long, obtuse, equaling the rather narrow filaments; mature capsule long-oblong, 1–2′ long, 3–4″ wide, very obtusely triangular, tapering upward.—From Idaho and Western Montana to Utah and Northern California. Frequent on the foot-hills through Nevada and Utah; 4,500–6,000 feet altitude; May–July. The "Sego" of the Utes and Mormons. (1,172.)

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[1] CALOCHORTUS, Pursh. (Including *Cyclobothra*, Sweet.) Perianth 6-parted, regular, deciduous, ventricose or broadly campanulate; sepals distinct, convolute in æstivation, the outer smaller, often greenish, oblong or lanceolate, acute or acuminate, spreading, usually beardless, the inner broadly obovate, cuneate and subunguiculate, bearded within and with a glabrous spot or nectariferous pit above the base. Stamens 6, inserted at the base of the sepals. Filaments subulate. Anthers linear-oblong, deeply perforated at the base for the insertion of the filament, erect, versatile. Ovary free, triangular, scarcely attenuate at the apex, 3-celled, with numerous horizontal anatropous ovules in two rows. Stigmas 3, sessile or subsessile, narrow, folded, recurved, persistent. Capsule triangular, coriaceous-chartaceous, septicidally 3-valved. Seeds usually in one row, somewhat compressed, angular, with a loose cellular testa. Embryo straight, terete, eccentric.—Herbs, with tunicated bulbs, erect somewhat branched leafy few-flowered stems, narrow and acuminate leaves, and terminal flowers.

CALOCHORTUS EURYCARPUS. Capsule 10″ long, 6″ broad, ovate, broadly winged; seeds in two rows; otherwise like the last.—East Humboldt Mountains, Nevada; 7–9,500 feet altitude; August. The characters of the pod and the altitude of the localities indicate a distinct species, but there is nothing whatever in the flower or habit to separate it from the last; where the ovary is young the two are indistinguishable. (1,173.)

CALOCHORTUS GUNNISONI. (*C. venustus*, Var. ?, Torr. *Bot. Gunnison's Rep., Pac. R. R. Surv.* 2. 130.) Habit as in the last; petals rounded at the apex, white above, yellowish-green below the middle and dark-purple at base, strongly bearded with longish gland-tipped hairs, which are also dark-purple at base, the densely hairy gland transverse and occupying nearly the whole width of the petal; anthers 5″ long, rather exceeding the somewhat dilated filaments, oblong-lanceolate, subcordate at base, narrowed above into an awn-like termination or acute; immature capsule narrowly oblong, attenuate above.—Rocky Mountains of Colorado. Collected also in Utah by Gunnison.

LLOYDIA[1] SEROTINA, Reich. *Kunth's Enum.* 4. 244. Stem 1- (rarely 2-) flowered, slender, erect or ascending, 2–5′ high; radical leaves filiform, equaling or exceeding the stem, triangular, semi-terete or teretish, the cauline ones short and diminishing upward, linear-lanceolate, amplexicaul or somewhat sheathing; sepals 4–5″ long, obovate, with three purplish lines.—Arctic Coast and Unalaska; Rocky Mountains of Colorado. East Humboldt and Clover Mountains, Nevada; 10,000 feet altitude; August, September. The present specimens, like those from Colorado, resemble Var. $\beta$., R. & S., from Unalaska, in their somewhat rigid leaves and in the rounded apex of the sepals. (1,174.)

ERYTHRONIUM GRANDIFLORUM, Pursh. *Flora*, 1. 231. (*E. giganteum*, Lindl.) Leaves 4–8′ long, 1–2½′ wide, oblong or elliptic-lanceolate, somewhat rough-margined, not spotted nor punctate; scape 6–15′ high, 1–10-flowered, peduncles racemed or subumbeled; segments yellow, 9–15″ long;

[1] LLOYDIA, SALIS. Perianth 6-parted, regular, persistent; sepals distinct, subequal, spreading, with a transverse margined nectariferous fold above the base, imbricate in æstivation. Stamens 6, inserted at the base of the sepals, erect-spreading; filaments subulate-filiform; anthers oblong, rounded at apex, deeply perforated at the emarginate base for the insertion of the filament, erect, versatile, longitudinally dehiscent along each margin. Ovary free, clavate-oblong, triangular, 3-celled, the ovules numerous, in two rows, horizontal, anatropous. Style persistent; stigma rather thick, shortly 3-lobed. Capsule obovate-elliptical, triangular, papyraceous, loculicidally 3-valved at the apex. Seeds in two rows in each cell, flattened, with a brown membranously margined testa and very small embryo.—Bulbous herbs; stem simple, leafy; leaves narrow and grass-like; flowers erect, white, with purple or greenish veins.

4-5 ALLIUM ANCEPS

narrow-lanceolate, acuminate, reflexed; stigma capitate or more or less 3-cleft and spreading; capsule 9–18″ long, 4–5″ wide, oblong, subtriangular.—From Washington Territory and Idaho to California and Colorado. Frequent in the Wahsatch and Uintas; 6–10,000 feet altitude; May–August. None of the reputed forms merit the rank of varieties. (1,175.)

LEUCOCRINUM[1] MONTANUM, Nutt. Leaves 6–8′ long, 1½″ wide, flat or somewhat folded-carinate toward the base, thick, striate-veined, decumbent; outer bracts broad and mostly obtuse, the inner very narrow and elongated; flowers 4–8, much shorter than the leaves, the peduncles ½–1½′ long, all radical, 1-flowered; tube persistent, 1–2′ long, filiform; segments of the limb 6–8″ long, oblong-lanceolate, acute; stamens equaling the sepals, the linear anthers about 2″ long; style equaling the filaments; capsule 3–4″ in diameter, scarcely appearing above ground.—Flowers pure white, very fragrant, appearing in early spring. The genus is referred by Endlicher to the little known Mexican *Weldenia*. The affinity is certainly close and the reference may prove correct. Southern Wyoming; Colorado; California, (380 Frémont, 1846.) Carson Valley, near Carson City; April. PLATE XXXVI. Fig. 1. Plant; natural size. Fig. 2. Flower, laid open; enlarged two diameters. Fig. 3. Capsule; natural size. (1,176.)

Also a much larger form, more nearly resembling Nuttall's original specimens; leaves 10–12′ long and 2″ wide, surrounded at base by the fibrous remains of the previous year's growth; the more advanced flowers 2′ in diameter; tube 4′ long, and the peduncle becoming 2′ in length; style mostly exceeding the stamens. Humboldt Valley, Nevada, near Oreana. (1,177.)

CAMASSIA[2] ESCULENTA, Lindl. *Kunth's Enum.* 4. 347. Scape 1–2½° high;

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[1] LEUCOCRINUM, NUTT. Perianth corolline, salver-shaped, marcescent; tube very slender, elongated; limb 6-parted, regular. Stamens 6, nearly equal; filaments adnate to the tube nearly its whole length, filiform; anthers erect, becoming curved, linear, 2-celled, attached by the emarginate base, introrse with a lateral dehiscence. Ovary globose-ovate, 3-celled; ovules about 12 in each cell, in 2 rows, horizontal or subpendulous, on short foot-stalks. Style filiform, undivided; stigma dilated into a somewhat triangular cup. Capsule subglobose, obtusely triangular, membranous, loculicidally dehiscent. Seeds 5–6 in each cell, in 2 rows, subglobose.—A perennial acaulescent herb, with a short thick subterranean root-stock and fleshy spreading elongated rootlets; leaves thick, linear, surrounded at base by membranous bracts; flowers white, peduncled.

[2] CAMASSIA, LINDL. Perianth 6-parted, spreading, withering-persistent; sepals very slightly connate at base, subequal, 3–5-nerved on the back. Stamens 6, inserted at the base of the perianth, shorter than the sepals, equal. Filaments filiform, ascending. Anthers oblong, 2-celled, introrse, emarginate above and bifid below, attached by the middle, longitudinally dehiscent along each margin. Ovary free, sessile, subglobose, 3-celled; ovules 8–16, in 2 rows, sessile, anatropous. Style filiform. Stigma with 3 short recurved lobes. Capsule chartaceous, rounded or oblong, obtusely triangular, loculicidally 3-valved. Seeds as the ovules, oblong, somewhat flattened, black.—Herbs with tunicated bulbs and leafless scapes; leaves linear, striate-nerved; flowers solitary, pedicelled, in a simple raceme, mostly bracted.

leaves broadly linear, 8–12′ long, 3–8″ wide; raceme elongated, 10–20-flowered; bracts longer than the pedicels; flowers blue-purple, 6–10″ long, with linear-lanceolate sepals; capsules oblong, 6–8″ long, 5″ broad, the cells 12–16-seeded.—Stouter than the eastern species, from which it differs in its broader leaves, larger flowers, oblong capsules, and more numerous seeds. Coatings of the bulb with numerous fascicles of acicular raphides, as in *Zigadenus Nuttallii* and *paniculata.* The genus appears sufficiently distinct from *Scilla*, (as Dr. Torrey has already said,) in its several-veined and more widely spread sepals and hypogynous stamens. Washington Territory to California. Antelope Island in Salt Lake, and in the Wahsatch; 4,500–6,000 feet altitude; June. (1,178.)

Allium validum. Stout, 1–2½° high, leafy at base; bulb with membranous coats, oblong, crowning a thick rootstock; leaves 3–5, nearly equaling the scape, 3–7″ broad, rather thick, flat; spathe 2–3-valved, valves broadly ovate, connate, acute; umbel erect or somewhat nodding, crowded, many-flowered, the pedicles 4–6″ long; sepals 4″ long, ovate-lanceolate, long-acuminate, gibbous at base, white or pink; stamens equaling the sepals and shorter than the filiform entire style; filaments dilated and adnate at base; capsule not crested; cells 2-seeded.—Near *A. cernuum*, but much stouter, umbels more erect and crowded, sepals longer and more acuminate, and capsule not crested. It is 6248 Bolander, from Mono Pass, and was also collected by Anderson near Carson City. East Humboldt and Clover Mountains, Nevada; in high swampy ground; 7–9,000 feet altitude; August, September. (1,179.)

Allium brevistylum. Scape slender, 1–1½° high, leafy at base; bulb with membranous coats, narrow-oblong, upon a thick rootstock; leaves 1–3″ wide, long-linear, somewhat shorter than the scape, thin and flat; spathe 1-valved, obliquely connate-campanulate, acute; umbel erect, few- (5–9-) flowered; pedicels short (3–6″;) sepals 4″ long, bright rose-color, lighter below, oblong-lanceolate, long-acuminate, gibbous at base; stigma more or less 3-lobed; capsule somewhat 3-lobed, not crested; cells 2-seeded.—Found on the shaded banks of the Provo River in the Uintas; 8,000 feet altitude; July. (1,180.)

Allium reticulatum, Nutt. (?) *Hook. Fl. Bor. Amer.* 2. 184, *t.* 195. Bulb oblong, the outer coatings densely reticulate-fibrous; scape terete, slender, 6–15′ high; leaves sheathing at the base, nearly equaling the scape,

[illegible] A. PALMERI

very narrowly linear; spathe 2–3-valved; umbel 15–30-flowered, the spreading pedicels 6–8″ long; sepals white or pinkish, ovate-acuminate, a third longer than the stamens, gibbous at base; style entire, equaling the stamens; capsule subglobose, the cells double-crested, 2-ovuled.—The specimens, somewhat doubtfully placed here, are peculiar in having the umbels almost wholly bulbiferous, but the few flowers have the characters of the species. Bear River Valley near Evanston, and Parley's Park in the Wahsatch; 6,000 feet altitude; July. (1,181.)

Allium bisceptrum. Bulb not crowning a perennial rootstock, often bulbiferous, the reticulation of the coatings minute and very sinuous; scapes (1–3) often in pairs, rather slender, 6–12′ high, leafy at base; leaves 2–4, linear, 2–6″ wide, usually equaling or often much exceeding the scape, flat, entire and sheathing toward the base; spathe 2-valved, valves very broadly ovate, abruptly setaceous-acuminate, but slightly connate; umbels many-(20–40-) flowered, rays 6–10″ long, occasionally bulbiferous; sepals white or rose-color, 4″ long, ovate-lanceolate, more or less acuminate, gibbous at base, the inner a little narrower; stamens a third shorter than the sepals, equaling the entire style, the dilated base of the filaments wholly adnate; capsule subglobose, 3-lobed, the lobes strongly crested; cells 1–2-seeded.—This is *A. falcifolium*, Var. ?, of Whipple's Report, collected by Bigelow at Downieville, California, 288 Anderson from near Carson City, and 89 Stretch from Washoe Valley, Nevada. On stream banks in the mountains, from the Trinity to the East Humboldt Ranges, Nevada, and in the Wahsatch; 6–7,500 feet altitude; May–July. "Pat-is" of the Pah-Utes. Plate XXXVII. Fig. 1. Plant; natural size. Fig. 2. Flower; enlarged two diameters. Fig. 3. Reticulation of the bulb-coat; enlarged thirty diameters. (1,182.)

Allium Nevadense. Bulb without rootstock, the reticulation rather minute, very much distorted; scape low (2–4′,) terete, with a single aversely compressed leaf, 1″ wide, sheathing at the surface of the ground, exceeding the scape; spathe of two broad slightly connate acute or often acuminate valves; pedicels 10–30, spreading, 3–7″ long; sepals 4–5″ long, white or pinkish, oblong-lanceolate, acute, gibbous at base, subspreading; stamens a little shorter or subequaling the sepals, scarcely exceeding the entire style, the filaments adnate at the slightly dilated base; capsule globose, the cells strongly 2-crested, 2-seeded.—Dry foot-hills and ridges from the Trinity to the East Humboldt Mountains, Nevada; 5–7,000 feet altitude; May–July.

Collected also by Marcy in the Wahsatch. "Urge" of the Pah-Utes. PLATE XXXVIII. Fig. 1. Plant; natural size. Fig. 2. Flower; enlarged two diameters. Fig. 3. Reticulation of the bulb-coat; enlarged thirty diameters. (1,183.)

ALLIUM ATRORUBENS. Much like the last. Sepals long-acuminate, dark-purple; spathe 2–3-valved; the coatings of the deep-seated bulb without trace of any marked reticulation.—Dry foot-hills from the West Humboldt to the Havallah Mountains, Nevada; 5,000 feet altitude; June. "Ko-si-urge" of the Pah-Utes. PLATE XXXVIII. Fig. 4. Plant; natural size. Fig. 5. Flower; enlarged two diameters. (1,184.)

ALLIUM ACUMINATUM, Hook. *Fl. Bor. Amer.* 2. 184, *t.* 196. Bulb without rootstock, the reticulation somewhat regularly hexagonal, usually distinct; scape slender, 6–15′ high; leaves sheathing, very narrowly linear, 1″ wide or less, folded-carinate, nearly equaling or shorter than the scape; umbel rather many- (12–30-) flowered, erect, pedicels spreading, 4–9″ long; spathe 2-valved, valves broad-ovate, abruptly setaceous-acuminate, slightly connate; sepals bright rose-color, 4–7″ long, ovate-lanceolate, long-acuminate with the point recurved, gibbous at base, the inner minutely serrulate; stamens about a third shorter than the sepals and nearly equaling the style; stigma shortly lobed; capsule not crested; cells 2-seeded.—From Fraser's River to California, and collected by Stansbury in Weber River Valley, (*A. stellatum*, Torr., *Stans. Rep.*) Havallah Range, Nevada, on Antelope Island in Salt Lake, and in the Wahsatch and Uintas; 5–6,000 feet altitude; May–June. "Kur-gur" of the Pah-Utes. PLATE XXXVII. Fig. 6. Reticulation of the bulb-coat; enlarged thirty diameters. (1,185.)

ALLIUM ANCEPS, Kellogg. *Trans. Calif. Acad.* 2. 109, *fig.* 32. Bulb without rootstock, the areolation of the coats vertically compressed hexagonal; scape 2–4′ high, somewhat flattened (1–2″ broad) and margined, naked; leaves (2) attenuated at base and scarcely sheathing above the bulb, exceeding the scape, thick, flat or sometimes folded, broad-linear (2–4′ wide,) falcate or variously curved, roughish on the margin; valves of the spathe 2, acute, connate at base; umbel many- (12–30-) flowered, pedicels spreading, ½′ long; flowers turbinate at base, pale-pink or greenish-white, the sepals linear-lanceolate, acute, 3–4″ long, slightly gibbous at base, the inner narrower, somewhat recurved; stamens about equaling the sepals, the filaments scarcely dilated and shortly adnate at base; style a little shorter, entire;

capsule slightly crested before maturity, the cells 2-seeded.—Closely allied to *A. falcifolium*, which is readily distinguished by its broader gibbous-based carinate and glandular sepals, the half-shorter stamens and style, and divided stigma, (PLATE XXXVI. Figs. 7 and 8. Flowers; enlarged two diameters,) and without marked reticulation in the bulb-coatings of the specimens examined. Near Washoe and Carson Cities, Nevada, (Veatch, and 23 Anderson, mostly;) now collected in the same region at Steamboat Springs and near Glendale; 4,500 feet altitude; April, May. PLATE XXXVI. Fig. 4. Plant; natural size. Fig. 5. Flower; enlarged two diameters. Fig. 6. Reticulation of the bulb-coat; enlarged thirty diameters. (1,186.)

ALLIUM TRIBRACTEATUM, Torr. Bulbs without rootstock, the coats with a rather minute flattened or somewhat regular hexagonal reticulation; scape slender, 1–4′ high, terete, naked; leaves not sheathing, very narrowly linear, ½–1½″ wide, exceeding the scape; spathe 2–3-valved; pedicels (10–20) scarcely equaling the flowers, spreading; sepals 3–4″ long, light-pink, oblong-lanceolate, acute, erect or recurved, exceeding the stamens; capsule not crested, the cells 1–2-seeded.—California. Antelope Island Peak, Salt Lake, and in the Wahsatch; 6–7,000 feet altitude; June. PLATE XXXVIII. Fig. 6. Flower; enlarged two diameters. Fig. 7. Reticulation of the bulb-coat; enlarged thirty diameters. (1,187.)

Var. (?) ANDERSONI. Bulb-reticulation scarcely distinguishable; bracts always only two, broad and connate; flowers turbinate at base; sepals very deep rose-color, oblong-lanceolate or broad-oblong, obtuse, erect.—Near Carson City, (63 and 286 Anderson.) On Mount Davidson and in Washoe Valley, near Steamboat Springs, Nevada; 5–7,000 feet altitude; April, May. (1,188.)

BRODIÆA[1] MULTIFLORA, Benth. *Baker, l. c., p.* 377. (*B. parviflora*, and *B. grandiflora*, Var., *brachypoda*, Torr.) Bulb with the outer coatings fibrous, 1′ or more in thickness; scape 1–2° long, fragile; leaves 1–1½° long, 1½–2″ wide, fleshy-herbaceous, rather firm; valves of the spathe 4–6″ long, several, broad-lanceolate; umbel crowded, 6–20-flowered, the pedicels shorter than

[1] BRODIÆA, SMITH. (Including *Dichelostemma*, Kth., *Stropholirion*, Torr., and *Brevoortia*, Wood.) Perianth funnelform or broadly tubular, the segments usually longer than the tube or about equaling it, rarely shorter. Anthers 3, linear, sessile or nearly so on the throat of the tube, with or without wings. Staminodia 3, flattened, membranous, in one row with the stamens. Ovary sessile or stipitate, the cells 4–6-ovuled; style straight, filiform; stigma capitate. Capsule membranous, oblong-triangular, sessile or stipitate, loculicidally 3-valved, the seeds 2–4 in each cell, small, triquetrous. Testa black, membranous.—Bulbous herbs with handsome umbellate flowers, several-valved spathes, and jointed pedicels. J. G. BAKER, *Revis. of Liliac., Jour of Lin. Soc.*, 11. 375.

The roots of this and the following genus are rather coated corms than tunicated bulbs.

the flowers, unequal; perianth 6–10″ long, blue, the oblong-lanceolate segments about equaling the ventricose tube; anthers 2″ long, sessile; stamin-odia 1½″ long, lanceolate, entire; ovary sessile, the style 2½″ long, filiform; seeds 4–6 in each cell.—California, and collected by Frémont on the Provo River, Utah.

MILLA[1] GRANDIFLORA, Baker; *l. c., p.* 380. (*Triteleia*, Lindl.) Bulb globose, 1′ in diameter, fibrous-coated, edible; leaves fleshy-herbaceous, flat or folded-carinate, equaling the scape, 2–4″ wide; scape slender, 1–2° high; bracts several (4–6,) distinct, lanceolate, 6–8″ long; rays 6–30, jointed, ½–1½′ long; perianth ½–1′ long, deep-blue, the segments oblong-spatulate, obtuse, erect, a little shorter than the broadly funnelform tube, throat 3–4″ wide; anthers 1″ long, in two rows, the lower sessile on the throat of the tube, the upper with short filiform filaments inserted upon the middle of the segments; ovary distinctly stipitate, the cells 6–8-ovuled; style 1½–2″ long, filiform; capsule 3–4″ long, ovate-oblong, the stipe 2½″ long.—From Washington Territory to Montana and southward to California. Abundant in the Wahsatch; 5–6,000 feet altitude; May, June. (1,189.)

MILLA HYACINTHINA, Baker; *l. c., p.* 385. (*Hesperoscordium*, Lindl.) Bulb globose, ½–1′ thick, fibrous-coated; leaves 2–3, fleshy-herbaceous, nearly equaling the scape, 1–6″ wide; scape firm, erect, 1–2° high; bracts 4–6, distinct, ovate-lanceolate or subulate-linear; pedicels 10–30, jointed, 6–15″ long; perianth 4–7″ long, funnelform, white, with greenish midveins, the segments lanceolate-spatulate, erect-spreading, thrice longer than the campanulate tube; stamens in one row upon the throat, the deltoid petaloid filaments scarcely 1″ in length; ovary distinctly stipitate; style 1″ long; capsule 2″ in diameter, subglobose upon a short thick stipe (1½″ long) or very nearly sessile; cells 2–3-seeded.—From Washington Territory to California; near Carson City, Nevada, (101 Anderson.)

MILLA MARITIMA. (*Hesperoscordium* (?), Torr. *Pac. R. R. Surv.* 4. 148.) Bulb fibrous-coated, ½′ thick; scape 3–6′ high; leaves several, very narrowly linear, ½–1″ wide, usually exceeding the scape, retrorsely aculeate-scabrous on

[1] MILLA, CAV. Perianth broadly or narrowly funnelform or subrotate, the segments about equaling the funnelform or campanulate tube or 2–4 times longer, rarely shorter. Stamens 6, always distinctly perigynous, in 1 (or more or less distinctly 2) series, the filaments usually elongated, rarely nearly obsolete; anthers linear-oblong, versatile. Ovary obovoid, sessile or more or less distinctly stipitate; style straight, filiform; stigma capitate, 3-sulcate. Capsule membranous, sessile or stipitate, loculicidally 3-valved; seeds 2–12 in each cell, small, triquetrous, loose or in two rows. Testa shining, black.—Bulbous herbs, with narrow leaves and umbellate flowers. BAKER, *l. c.*

the margin; spathe 4–6-bracted, the segments subulate-linear, connate at base; pedicels 6–12, not jointed, ½–1′ long; perianth 3″ long, greenish or yellowish-white with darker subcarinate midveins, the segments very shortly connate at base, erect or subspreading, oblong or lanceolate, somewhat sacculate at the tip; stamens in one row, shorter than the sepals, the filaments subulate from a scarcely dilated adnate base; style rather thick, with a shortly 3-cleft or capitate stigma; capsule globular, sessile, the cells obtuse, 10-ovuled and about 3-seeded.—Approaching *Allium* § *Nothoscordum*, from which it is separated especially by the characters of the root, which is that of *Milla* and *Brodiæa*, a fibrously coated corm, the older flat and disk-like joints fringed with rootlets and easily separating. Coast of California from Monterey to Punta de los Reyes. Near Steamboat Springs in Washoe Valley, Nevada. (1,190.)

Yucca ——— ? A communication from Dr. George Engelmann upon the western species of this genus will be given in the Appendix.

## JUNCACEÆ.

Luzula spadicea, DC. *Steud. Syn. Cyp.* 202. Shortly stoloniferous; leaves flat, nearly smooth; sheaths smooth or bearded at the throat; inflorescence twice-compound, spreading, longer than the involucre; sepals nearly equal, ovate, mucronate, shorter than the triangular-ovate capsule; stamens a fourth shorter than the sepals; testa of the subglobose seed very shortly papillose at the apex. Var. parviflora, Led. Stolons slightly longer; radical leaves long and dilated, smooth throughout; branches of the decompound cyme very unequal; flowers very small and brownish, the lateral ones on long capillary at length nodding pedicels; anthers scarcely exceeding the filament.—Ledebour, Hooker and other authorities agree in referring *L. parviflora*, *melanocarpa*, &c., to *spadicea*. The specimens of the collection vary to some extent;—1–2° high, the sheaths for the most part somewhat bearded; flowers light or dark-colored; capsule acute or very obtuse, mucronate. From Northern New York to Maine and Labrador; Canada, and westward in the Rocky Mountains, and to Washington Territory, Sitka and Behring Strait; Colorado. East Humboldt and Clover Mountains, Nevada; and in the Wahsatch and Uintas; 9,000 feet altitude; July–September. (1,191.)

Luzula campestris, DC. Throughout the eastern United States, in Arkansas, Colorado and California, and northward to Newfoundland, the Sas-

katchewan and Behring Strait. The specimens are good enough *comosa*, which is not distinguishable from forms of *campestris*, and has been referred to it by Dr. Hooker. In the Uintas near the head of Bear River; 8,000 feet altitude; July, August. (1,192.)

LUZULA SPICATA, Desv. White Mountains, Labrador, Greenland, Behring Strait, Rocky Mountains in latitude 49°, (Lyall,) and in Colorado. East Humboldt and Uinta Mountains; 9–11,000 feet altitude; August. (1,193.)

JUNCUS BALTICUS, Deth., Var. MONTANUS, Eng. *Revis. Junc., Trans. St. Louis. Acad.* 2. 442. Sepals nearly of the same length, the inner ones sometimes more obtuse; anthers four times longer than the filament; capsule ovate-pyramidal, angled, beaked; seeds smaller, narrower and longer pointed than in the eastern form.—From New Mexico and Colorado to the Saskatchewan and Slave Lake, and west to California, Washington Territory and Unalaska. Abundant in marshes throughout Nevada and in Utah; 4–6,000 feet altitude. Known as "Wire grass" and considered valuable for hay and pasturage. (1,194.)

Var., approaching *J. Lesueurii*, Bol.; with large flowers, 3″ long; capsules abruptly mucronate; stem 3° high. On Truckee River. (1,195.)

JUNCUS FILIFORMIS, L. Northern New England to Michigan, Canada and Hudson's Bay, the Saskatchewan and Great Bear Lake; Cascade and Rocky Mountains, (Lyall;) Colorado, (Vasey.) Uintas; 8–9,000 feet altitude; August. (1,196.)

JUNCUS DRUMMONDII, E. Mey. *Eng., l. c.*, 445. Cæspitose; stems 1–1½° high, terete and filiform; sheaths bristle-pointed; spathe ½–1½′ long, more or less exceeding the simple about 3-flowered panicle; sepals 2–3″ long, lanceolate, acute or the outer ones pointed; stamens 6, 1″ long or less; anthers linear, the filaments a little shorter; stigmas included, shorter than the slender prismatic ovary; style very short, persistent; capsule ovate-oblong, triangular, retuse, 3-celled, about equaling or shorter than the sepals; seeds ovate, striate-reticulate, long-caudate.—Alpine Mountains of Colorado and California to Washington Territory and Unalaska. Wahsatch and Uintas; 9–10,000 feet altitude; July, August. (1,197.)

JUNCUS PARRYI, Eng.; *l. c.*, 446. Cæspitose; stems low, (4–8′,) setaceous, longer than the sulcate subterete leaves; spathe 1′ or more long, exceeding the simple 1–3-flowered panicle; sepals 2½–3½″ long, lance-subulate, the outer ones longer and awned; stamens 6, about 1″ long; anthers linear,

2–3 times longer than the filaments; stigmas included, scarcely equaling the linear-prismatic ovary; capsule prismatic, pointed, exsert, 3-celled; seeds oblong, finely striate-ribbed, long-caudate.—Mountains of Colorado, California and Oregon. East Humboldt and Clover Mountains, Nevada, and in the Wahsatch; 8–10,000 feet altitude; July–September. (1,198.)

JUNCUS BUFONIUS, L. Everywhere. Frequent through Nevada and Utah, usually in the valleys; 4–6,000 feet altitude; but also collected (dwarf specimens, ½′ high, 2–3-flowered) in the Clover Mountains, Nevada, with the next, at a height of 9,000 feet; May–September. (1,199.)

JUNCUS TRIFORMIS, Eng.; *l. c.*, 492. Annual; stems very low, leafy, branched; peduncles capillary, scapelike, numerous, ½–4′ long, much exceeding the short (2–12″ long) filiform leaves, which are channeled, but flat toward the apex; flowers 1–6, in small heads or solitary; sepals lance-subulate, equal, 1–1¾″ long, about equaling the ovate-obtuse mucronate 2–3-celled capsule; seeds ovate, obtuse, short-pointed, faintly ribbed and transversely lined. Var. UNIFLORUS, Eng. Very small, 1′ high or less, with the solitary 2-bracted flowers mostly dimerous, (sepals 4, stamens, stigmas and carpels in pairs.)—California. Clover Mountains, Nevada; 9,000 feet altitude; September. Less than a half-inch high; bracts very small, nearly obsolete. With a diminutive state of the last; evidently a starved, stunted form. (1,200.)

JUNCUS LONGISTYLIS, Torr. *Bot. Mex. Bound.* 223. *Eng.*, *l. c.*, 453. Stems 1–2° high, cæspitose, stoloniferous, teretish above, usually minutely scabrous, leafy; leaves flat, grass-like, 1″ wide, shorter than the stem; heads few (5–9) in a contracted (1½–3′ long) panicle, 3–8-flowered, or rarely single and 12–15-flowered; flowers 2½–3″ long, greenish with brown lines, smooth, pedicelled; sepals equal, ovate-lanceolate, acute or cuspidate; stamens 6, one-half as long; filaments half as long as the anthers; ovary equaling the stamens and style; stigmas exserted; capsule ovate, obtuse, mucronate or rostrate, chestnut-colored and shining, 3-celled, equaling or a little exceeding the calyx; seeds oblanceolate or obovate, pointed, costate-reticulate.—From New Mexico and Arizona northward to the Saskatchewan and Washington Territory. In wet meadows in Nevada and Utah; 4–8,000 feet altitude; June–September. (1,201.)

Var. LATIFOLIUS, Eng.; *l. c.*, 496. Stem 1° high, naked or with a single leaf at base, much exceeding the short linear-lanceolate leaves, 2–5′ long, 2–3″ wide; panicle simple, longer than the membranous or rarely foliaceous

spathe; heads few- (3–5-) flowered; anthers 3–4 times longer than the filament.—Sierras of California; near Carson City, (Anderson.)

JUNCUS NODOSUS, L., Var. MEGACEPHALUS, Torr. From New York and New Jersey to the Saskatchewan and southward beyond the Mississippi to Texas, New Mexico, Arizona and California. Valleys of Nevada; 4–6,000 feet altitude. (1,202.)

JUNCUS MERTENSIANUS, Bong. *Eng.*, *l. c.*, 479. Stems 4–14′ high, from a thick running rootstock, cæspitose, compressed, weak; leaves aversely compressed, usually ½–1″ wide, sheath auricled; flowers 15–25, dark-brown, pedicelled, in a single (rarely 2–3) rather loose head, 4–6″ broad; sepals ovate-lanceolate, the outer acuminate-subulate, the inner obtuse and mucronate, or rarely acute and equaling the outer ones, exceeding the (3–) 6 stamens and equaling or exceeding the broadly obovate obtuse mucronate capsule; anthers usually mucronate, equaling or shorter than the filaments; style mostly shorter than the obtuse ovary; seeds oblanceolate-obovate, short-caudate at each end, reticulate-costate.—Sitka and Unalaska, and in the mountains from Washington Territory and eastward to California and Colorado. East Humboldt and Clover Mountains, Nevada, and in the Uintas; 7–9,000 feet altitude; July–September. (1,203.)

JUNCUS XIPHIOIDES, E. Mey., *Eng.*, *l. c.*, 481. Stems 1–4° high, from a thick running rootstock, 2-edged; leaves compressed and equitant; flowers about 1½″ long, pedicelled, few or many, in few or many heads; sepals lanceolate, subulate-acuminate, equal, or the inner ones more obtuse and shorter, nearly twice longer than the 6 (rarely 3) stamens, usually equaling the angular acute mucronate or beaked capsule; anthers oblong-linear, about equaling the filaments; ovary ovate, attenuate into a rather short style, stigmas subexserted; seeds ovate-lanceolate, pointed at each end, reticulated and transversely lined.—Var. *a.* LITTORALIS, Eng. Stout, 2–4° high; leaves broad, (3–6″;) sheaths rarely appendaged; panicles often decompound, 4–8′ long, with 3–20 straw-colored or brown flowers in each head; sepals subequal, scarcely shorter than the acute or beaked capsule; anthers often pointed, a little exceeding the filament; seeds oblanceolate.—California. On the Truckee River and Soda Lake, Nevada. (1,204.)

Var. MONTANUS, Eng. Lower, ½–2° high; leaves narrower (½ -1½″) and mostly auricled at base; heads 3–10-flowered, rather numerous and panicled; flowers pale and a little smaller, the inner sepals shorter and mostly acute, the

outer equaling the long-mucronate capsule.—Arizona to Western Texas. East Humboldt Mountains and in the Wahsatch; 6,000 feet altitude. (1,205.) It also occurs with few (rarely solitary) heads, the flowers 12–20, or even 20–50, dark-brown.—From the Saskatchewan to Washington Territory and south to Colorado and New Mexico. More frequent in Nevada, and also collected in the Uintas; 4–8,000 feet altitude; July–September. (1,206.)

Juncus chlorocephalus, Eng.; *l. c.*, 485. Stems 1–1½° high, from a short running rootstock, cæspitose; leaves ½–1″ wide, compressed and equitant, with auriculate sheaths; heads 6–7″ broad, many- (15–25-) flowered, solitary or 2–3 and clustered, about equaling the membranous spathe; flowers 2½″ long, conspicuously pedicelled, pale; sepals oblong, very obtuse or the outer (very rarely the inner) ones mucronate, with broad membranous margins, equal or the inner ones a little the longest, scarcely exceeding the stamens; anthers long-linear, on very short filaments; style exserted, much exceeding the ovate ovary; capsule ovate, obtuse, mucronate, 1-celled, shorter than the sepals; seeds ovate, pointed at each end, reticulate.—Mountains of California; near Carson City, Nevada, (Anderson.)

## PONTEDERIACEÆ.

Schollera graminea, Willd. From North Carolina to Canada; on the Lower Rio Grande, (Schott.) On the Carson River, near Empire City, Nevada, (507[a], Torrey.)

## COMMELYNACEÆ.

Tradescantia Virginica, L. From Florida to Western New York and Lake Winnipeg, and westward to Western Texas, New Mexico, and the base of the Rocky Mountains. Reported by Durand as collected on Elk Horn Creek in Utah.

## CYPERACEÆ.

Cyperus inflexus, Muhl. From North Carolina to Canada and Lake Winnipeg, and west to Missouri and the Upper Platte, (James,) Arkansas and New Mexico; California. Truckee, Humboldt and Ruby Valleys, Nevada; 4–6,000 feet altitude; July–September. Referred by Dr. Bentham and Dr. Torrey to *C. aristatus*, Rottb. (1,207.)

Cyperus phymatodes, Muhl. From Florida to New York, and west to New Mexico, Arizona, and California. Truckee River bottom, Nevada; July, August. Low, 6–10′ in height. (1,208.)

Eleocharis palustris, R. Br. From the Arctic Regions to the Gulf and westward. Collected in Nevada and Utah. (1,209.)

Var. Tall and stout, ($2\frac{1}{2}$° high,) with large loose deeply cleft sheaths; bristles exceeding the oblong-triangular obtuse tubercle. Fruit occasionally ergotized. Huntington Valley, Nevada; 6,000 feet altitude. (1,210.)

Eleocharis acicularis, R. Br. Northern States to Hudson's Bay and the Saskatchewan, and southward to Florida and Texas; California. Truckee River bottom, Nevada. (1,211.)

Scirpus Torreyi, Olney. New England to Pennsylvania and Wisconsin. Collected by Stansbury on Stansbury Island, Salt Lake, with longer and larger spikes and the achenium with a shorter point than in the eastern form.

Scirpus validus, Vahl. From latitude 57° southward to Florida, Texas, New Mexico, and Southern California. Frequent on stream-banks and in marshes in the valleys of Nevada; 4–6,000 feet altitude. Growing 8–12° high and 1′ in diameter. (1,212.)

Scirpus Nevadensis. Culm 8–12′ high, slender, terete, substriate, from a perennial (?) root, exceeding the convolute leaves, which are flattened above and rough margined; spikes 1–2, 3–9″ long, many-flowered and terete, ovoid or ovate-oblong, acutish, sessile, much shorter than the semi-terete flattened above and rough-margined erect involucral leaf; scales broadly ovate, obtuse or acute with the projecting midvein, chestnut-colored, smooth and shining; stamens 3; style 2-cleft; bristles 1–3, very short; achenium broadly obovate, plano-convex, very abruptly short-pointed, shining, minutely reticulated.—Shore of Soda Lake in Carson Desert, Nevada; August. (1,213.)

Scirpus maritimus, L. Sea-coast and salt-springs from New Brunswick to Florida; on the Saskatchewan; Washington Territory and California; New Mexico and Arizona. Humboldt Valley, Nevada. (1,214.)

Scirpus microcarpus, Presl. New England; Northwest Coast, latitude 55°, (Scouler.) Monitor Valley, Pah-Ute and East Humboldt Mountains, Nevada, and in the Wahsatch; 5–7,000 feet altitude. (1,215.)

Fimbristylis thermalis. Scabrous-pubescent throughout; culms 1–$1\frac{1}{2}$° high, from a perennial stoloniferous root, rigid, compressed, striate; leaves shorter, 1–2″ broad, channeled and more or less convolute; spikes 3–5, the

central one sessile, with an involucre of 3 setaceous leaflets mostly shorter than the rays, 3–6″ long, ovate or ovate-oblong, the scales rather thin, light chestnut-color, pubescent, rather obtuse or acutish, mucronate; stamens 3; style 2-cleft, flat and ciliate, deciduous; achenium broadly ovate, subcompressed, very minutely striate and obscurely reticulate.—Near *F. spadicea* but rough-pubescent throughout, the scales thinner and less rigid, the achenium more turgid and rather smaller, the scales and sheaths less deeply colored. Found near the Hot Springs in Ruby Valley, Nevada; 6,000 feet altitude. *F. spadicea* has been collected in Texas, the Indian Territory, and Colorado, (581 Hall & Harbour,) the upper stem and scales sometimes slightly scabrous. (1,216.)

CAREX[1] NIGRICANS, C. A. Meyer. Spike solitary, oblong, staminate at top; stigmas 3, or rarely 2; perigynium ovate, stipitate, ventricose, shining, gradually attenuated into a beak, sometimes few-toothed, nerveless, spreading or at length reflexed, rusty-colored, with an entire obliquely-cut mouth, about equaling the dark-brown oblong obtuse scale; the lowest scale rarely subleafy; achenium unequally 3-sided. Root creeping; culms 6–12′ high. (*C. rupestris*, Dewey, *Coll.*, in part. *C. Backana*, Dewey, in part. *C. Pyrenaica*, Torr., *Mon. Cyp.* 403, (1836,) and in Williamson's Report, *Pac. R. R. Surv.* 6. 92.)—Rocky Mountains of British America, (258 and 259 Drummond;) Colorado, (609 Hall & Harbour, 589 and 589 A., Vasey;) Cascade Mountains, Oregon, (Newberry;) Alaska, according to Rothrock. Bear River Cañon, Uintas; 9,000 feet altitude; August. (1,217.)

CAREX PYRENAICA, Wahl. Spike solitary, densely flowered, staminate at top, elliptic, rusty-brown; stigmas 3, rarely 2; perigynium fusiform or lanceolate, gradually attenuate, long-stipitate, nerveless, compressed, triquetrous, shining, at length horizontally spreading or reflexed, rusty-colored, the orifice cleft in front with its hyaline margins infolded, longer than the acute-lanceolate or obtuse-oblong rusty-brownscale; lowest scale rarely subleafy; achenium unequally triquetrous. Cæspitose; root fibrous. (*C. nigricans*, Torr., *Mon. Cyp.* 402; Dewey, *Sill. Jour.* 29. 249, 1836.)—Fort Norman (Richardson) and Rocky Mountains, (Drummond;) Colorado, (608 Hall & Harbour, 590 Vasey.) Rocky divide of the Uintas; 10,000 feet

[1] To Col. STEPHEN T. OLNEY, of Providence, R. I., we are indebted for the following thorough elaboration of the *Carices* of the collection.

altitude; August. (1,218.) *C. microglochin*, Wahl., was found in Northern Alaska, 1861–'62, by Onion, Kinnicott, and Hardisty.

Carex scirpoidea, Michx. From Maine (Blake) to Michigan; Greenland and Arctic America; Rocky Mountains, (Drummond and others;) Cascade Mountains, Oregon. East Humboldt and Clover Mountains, Nevada, and in the Uintas; 9–10,000 feet altitude; August, September. (1,219.)

Carex affinis, R. Br. Spike solitary, staminate at top; stigmas 3; scales acute, lanceolate, the lower awned; near *C. polytrichoides.*—Such is Brown's too brief description in Richardson's Appendix to Franklin's Narrative. Boott, in *Hook. Fl. Bor. Am.*, remarks that the specimen in Herb. Banks. has setaceous leaves and looks like *C. filifolia.* In his *Illustrations* he refers it to *C. obtusata.* It differs from *C. filifolia* in the form and texture of the scale and in its elliptical perigynium, not oval, nor scabrous except on the margins. Its orifice is not entire. From *C. obtusata* it differs in its setaceous leaves, (those of *obtusata* are described by European authors as flat, and so appear in both European and American specimens,) and in the shape and texture (not horny) of the perigynium, while the root is fibrous, not creeping. It is also closely allied to *C. Lyoni*, (named by Boott on an immature specimen,) but differs from his detailed description in the top of its leaves being hispid, the perigynium not entirely smooth, the style not inserted, nor the stigma short. Collected by Richardson in the wooded region of British America, latitude 54–60°, and by Vasey (591) in Colorado. East Humboldt Mountains and on Clover Peak, Nevada; 10–11,000 feet altitude; September. (1,220.)

Carex disticha, Huds. From New York to Illinois and Wisconsin, and westward to the Saskatchewan and the Pacific; California, (Bolander;) Western Nevada, (Stretch, in Herb. Torrey.) A single spike occurs in the collection, probably from the same region. (1,221.)

Carex stipàta, Muhl. From Arctic America to Florida and on the western coast to Columbia River. Near Farmington, Salt Lake Valley, Utah; 4,300 feet altitude; June. (1,222.)

Carex muricata, L., (not including *C. Hookeriana*, Dew.[1]) Massachusetts; Rhode Island, (J. W. Congdon;) New Jersey, (Austin;) Ohio and

[1] Carex Hookeriana, Dew. The figure of this in *Hook. Fl. Bor. Am.* is excellent and the analysis poor, Dr. Boott disclaiming any agency in making them. As late as April 24, 1863, the year that he died, he made this memorandum on a Californian plant (1569 Brewer) now before me: "This was founded

Kentucky. East Humboldt Mountains, Nevada; 8,500–9,000 feet altitude; July. (1,223.)

Var. GRACILIS, Boott, in part. Spikes chestnut-colored, narrow, ovate, with 4–6 ovate few-flowered spikelets; leaves lax, long, and narrow.—Colorado (592 Hall & Harbour, 603 Vasey) and New Mexico, (884 Fendler.) In the East Humboldt Mountains, Nevada, and in the Wahsatch above Salt Lake City; 5–9,000 feet altitude; May–August. (1,224.)

CAREX DOUGLASII, Boott. Spike diœcious, with about twelve, sometimes more, ovate spikelets, the upper closely aggregated, the lower occasionally remote and compound; bracts sometimes setaceous, broad at base, sometimes scale-like and mucronate; style exserted; stigmas 2, very long; perigynium elliptic-lanceolate or ovate, tapering to a long serrated bifid beak, shorter than the lanceolate acute scale; achenium orbicular. Root creeping; culm 6–12′ high. (*C. Nuttallii*, Dew., *Sill. Jour.* 43. 92, 1841. *C. Meekii* Dew., *Sill. Jour.*, *n. s.*, 24. 28, 1857. *C. siccata*, Dew., in *Emory's Report.*)—In various collections; from the Rocky Mountains in latitude 52° to Washington Territory and southward to California, Nebraska, Colorado, (594 Vasey, Rev. E. L. Greene,) New Mexico, (878 Fendler,) and Northern Mexico, (Parry.) Rather frequent on slightly moist foot-hills and ridges in Western Nevada, at 4–6,000 feet altitude, and found in the Wahsatch at the height of 7,000 feet; May–August. (1,225.)

Var. MINOR, Olney. (*C. petasata*, Dew., in Hayden's *Nebraska Plants.*) Spikes small, not closely aggregated; perigynium and scale small.—Nebraska, (Hayden, 600 Hall & Harbour.)

Var. BRUNNEA, Olney. Leaves longer or equaling the culm; spikelets few; bracts scale-like, the lower long-awned; scales and stigmas brown.—California, (805 Coulter, 4503 Bolander.) Carson and Steamboat Spring Valleys, Nevada; 4,500 feet altitude; May. All immature. (1,226.)

CAREX MARCIDA, Boott. Spike oblong, pale, composed of numerous small ovate aggregated androgynous spikelets, staminate at top, the lower spikelets compound; stigmas 2; perigynium tawny, suborbicular, or ovate tapering to a bifid beak, plano-convex, nerved, winged, the upper margins serrated, short-

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on a delicate plant originally from Carlton House, the specimen not mature, and the seed had no nerves; your specimens are mature and show more or fewer nerves, the spiculæ 4–6. (Are they ever more numerous?) It is near *C. muricata*, L., but differs in erect appressed seeds and smaller spiculæ, all of which have bracts and cuspidate squamæ."—*C. Hookeriana*, Dew., in *Bot. Mex. Bound.*, is, I think, *C. muricata.*

stipitate, nearly equal to the acute ovate scale, which is of a pale straw-color with a white membranous margin; achenium tawny, lenticular, contracted at base. Culm 1–2° high, rigid; leaves broad, linear, erect.—Sitka, (Bongard;) Washington Territory, (Scouler;) California, from the Sacramento to the southern boundary; Nebraska, (Hayden;) Colorado, (Hall & Harbour, and E. L. Greene.) Found in subalkaline meadows in Unionville and Thousand Spring Valleys, Nevada, and in Jordan Valley, Utah; 4,300–5,000 feet altitude; May–October. (1,227.)

Carex Hoodii, Boott. Spike composed of ten or more androgynous ovate spikelets, generally naked, sometimes bracteate, closely congested, staminate at top; stigmas 2; perigynium ovate, beak bifid, (the orifice deeply cleft in front,) purplish, nerved on both sides, serrate on the margins equal in breadth and length, sometimes longer than the acutely ovate striate scale, which has a green nerve and hyaline margins; achenium orbicular with a contracted base. Culm 1½–2° high, leafy below, the rudimentary sheathing leaves blackish-purple.—From Washington Territory to California, (1772, 1986, and 2354 Brewer, the first at 9,000 feet altitude; 6215 and 6218 Bolander.) In the Wahsatch, near Salt Lake City; 5,000 feet altitude; May. (1,228.) *C. Hoodii*, Boott, in Whipple's Report, *Pac. R. R. Surv.* 4. 153, is *C. Brongniartii*, Kth.

Carex tenella, Schk. From New England to Michigan and the Saskatchewan and northward to Arctic America, and south in the mountains to Colorado and New Mexico. Uinta Mountains, in Provo and Bear River Cañons; 7–8,500 feet altitude; July, August. (1,229.)

Carex vitilis, Fries. Spike oblong, composed of 4–7 small few-flowered androgynous spikelets, staminate at base; stigmas 2; perigynium spreading, oval or ovate-conic, beaked, the orifice deeply cleft anteriorly, scabrous above on the margins, irregularly nerved, (nerves of the same color, those on the back obsolete or vanishing upward,) membranous, spongy at base, longer than the acute or obtuse ovate scale; achenium oval.—(*C. canescens*, L., Var. *vitilis*, Gray; *Manual.*) Two forms occur:

Forma brunnea. Arctic America; Canada; Mountains of New Hampshire, Pennsylvania, Carolina, and Georgia.

Forma pallida. Arctic America; New Hampshire; Massachusetts; New Jersey, (Canby.) Uintas, near head of Bear River; 8,000 feet altitude; August. (1,230.)

Carex elongata, L. Spike of 6–12 oblong rusty-green spikelets, staminate at base, the upper all contiguous, the lower quite remote; bracts scale-like, cuspidate, rarely surpassing the spikelets; stigmas 2; perigynium elliptic-lanceolate, beaked, with an emarginate orifice, scabrous above on the margins, nerved on both sides, plano-convex, spongy at base, spreading or recurved, at length tawny, longer than the ovate rusty scale, which is hyaline at top. Root creeping, cæspitose; culm 1–2° high, triquetrous.—Sitka, (Bongard.) Uinta Mountains, shore of a small subalpine lake near head of Bear River; 9,500 feet altitude; August. With it were growing the next two species and also *C. limula*, *saxatilis*, *Magellanica*, *Buxbaumii* and *vesicaria*. (1,231.)

Carex Bonplandii, Kth. Spikes of 8–12 blackish-purple or rusty spikelets, more or less bracted, staminate at base; stigmas 2; perigynium ovate or ovate-lanceolate, gradually tapering to a beak, the orifice entire and deeply cleft in front, wingless, more or less serrate on the margins at the apex, nerved, plano-convex, equaling the ovate subacute scale; achenium oblong-ovate, contracted at base, biconvex and apiculate. (*C. Pardiei*, Boott, *Ill.*) Var. minor, Olney. Spikelets small, fewer; bracts scale-like.—Rocky Mountains of Colorado, (591 Hall & Harbour, according to Boott; 591 and 601 ? Vasey;) California, (4903 and 6207 Bolander; 550 Torrey.) In the Uintas, with the last; 9,500 feet altitude; August. (1,232.)

Carex lagopina, Wahl. Spike oval or oblong, reddish-brown, naked, composed of 3 (rarely 4–6) spikelets, staminate at base, the lowest or lower ones wholly pistillate, the upper or all closely aggregated; bracts scale-like, broad, rarely exceeding the culm; stigmas 2; perigynium oval or elliptic-lanceolate with a more or less tapering beak, or subrotund with a short abrupt beak, the orifice entire and cleft in front, nerved on both sides, pale at base, tawny above, wingless, plano-convex, smooth, toothed above on the margins, longer than the ovate obtuse dusky scale, which has a white hyaline margin. Root fibrous; culm 4–12′ high—Greenland; Rocky Mountains of British America, (268 Drummond;) California, near Ebbett's Pass, at 8,200 feet altitude, (2063 Brewer.) In the Uintas, with the last two species. (1,233.)

Carex leporina, L. *Fl. Suec.* Spike oblong, tawny, brown, composed of 5–6 (rarely more) nearly round or obovate spikelets, staminate at base, alternately contiguous, sometimes aggregated into an elliptical head, the high-

est club-shaped; bracts sometimes filiform, not equal to the spikelets; stigmas 2; perigynium ovate, gradually tapering to a beak from an ovate base, the orifice obliquely cut, winged, and serrated upon the margins above the middle, nerved upon both sides, tawny, quite equaling the ovate-lanceolate acute scale, which is whitish-hyaline with tawny margins; achenium oblong, lenticular, stipitate, shining, chestnut-colored, apiculate at the base of the style. Root woody-fibrous.—Colorado, at 12,000 feet altitude, (599 and 600 Vasey.) Highest peak of the Clover Mountains, Nevada, and in a rocky gorge of the Uintas above the head of Bear River; 11,000 feet altitude; August, September. (1,234.)

CAREX FESTIVA, Dewey. Spike ovate or nearly round, naked or bracteate, composed of 6–12 nearly round androgynous spikelets, staminate at base, closely aggregated into a head; stigmas 2; perigynium ovate-elliptical, tapering to a beak, the whitish-hyaline orifice obliquely cut anteriorly and finally bidentate, slightly nerved on both sides, winged, serrated on the margins above the middle, rusty-tawny, a little exceeding or about equaling the lanceolate obtuse whitish-hyaline rusty-margined scale; achenium oblong-obovate, abruptly apiculate, rusty-colored. Cæspitose.—From Great Bear Lake to California, Colorado, (589 and 590 Hall & Harbour; 586 and 587 Vasey,) and New Mexico, (882 Fendler.) East and West Humboldt Mountains and intervening ranges of Nevada, and in the Wahsatch and Uintas; 5–9,000 feet altitude; June–August. (1,235.)

CAREX HAYDENIANA, Olney. Spike ovate or nearly round, composed of about six spikelets in a dense head staminate at base; bracts scale-like and cuspidate; perigynium ovate, tapering to a long beak with an obliquely cut orifice, membranous, compressed, winged, doubly serrate on the margins, faintly and few-nerved at base, yellowish, dark-purple at top or finally throughout, spreading, longer than the ovate acute hyaline-margined scale; achenium straw-colored, elliptic-lenticular. Root fibrous; culm 4–8′ high; leaves flat, rough at top, narrow, shorter than the culm.—Allied to *C. festiva*. California, (5074 Bolander;) Uinta Mountains, Eastern Utah, (Dr. F. V. Hayden, 1870.)

CAREX ATHROSTACHYA, Olney. Spike ovate, straw-colored, rusty-tinged, composed of 8–20 crowded spikelets, the lowest sometimes forming a remote distinct head; bracts 3–5, leafy, involucre-like, expanded at base into a hyaline margin, the lowest much longer than the culm; stigmas 2; perigyn-

ium ovate-lanceolate or lanceolate, tapering to a long bifid beak, spongy at base, winged, serrate and waved on the margins, slightly nerved, shorter than or nearly equaling the ovate-lanceolate acuminate scale, which is membranous with bright rusty-colored margins. Root fibrous; culm 1–2° high, leafy.—Yosemite Valley, California, (1650 Brewer, 552 Torrey, 6213 Bolander;) Colorado, (587 D., Vasey.) Truckee River, Nevada, near the Big Bend, (W. W. Bailey;) 4,000 feet altitude; August. (1,236.)

Var. MINOR, Olney. California, (Brewer and Hillebrand.) Young specimens from the Wahsatch Mountains may doubtfully be referred here; 9,000 feet altitude; August. (1,237.)

CAREX LIDDONI, Boott. Spike erect, oblong, rusty-white, composed of 3–6 androgynous club-shaped spikelets, the upper half pistillate, the lower staminate, contiguous, simple; bracts scale-like, long-acuminate; stigmas 2; perigynium lanceolate, tapering to a bifid beak, deeply cleft in front, winged, slightly nerved, compressed, loosely imbricated, bright rust-colored above, longer than or nearly equaling the lanceolate acuminate, acute or cuspidate scale, which is of a bright-rusty color, whitish-hyaline on the margins and scabrous on the nerve; achenium lanceolate, stipitate. Culm 2–3° high, exceeding the leaves.—On the Columbia River, (Scouler!) East Humboldt Mountains, Nevada, near snow at 9,000 feet altitude; July, August. (1,238.) References to doubtful plants that have been referred to this species are omitted.

CAREX STRAMINEA, Schk. Throughout North America; Colorado, on Hayden's Survey, (Thomas, 422 Greene.) In the Uintas, on a snowy divide between the Provo and Duchesne Rivers; 10,000 feet altitude; July. (1,239.)

CAREX LIMULA, Fries., (not of Gray's *Manual.*) Spikelets erect, 3–4, the terminal one (or sometimes two) staminate, the remainder pistillate, often with staminate flowers at the apex, oblong, cylindrical, the lowest pedunculate; bracts leafy, surpassing the culm, with small blackish auricles; stigmas 2; perygnium oblong, compressed, faintly nerved, exceeding or equaling the black oblong single-nerved scale; achenium obovate, compressed. Culm 2–2½° high, acutely angled; leaves erect, flat, rough on the margins, the sheathing base-leaves not fibrillose.—Colorado, at 11,300 feet altitude, (582 Vasey.) In the Uintas on the shore of a subalpine lake, with *C. elongata*, &c.; 9,500 feet altitude; August. (1,240.)

This seems to be a very distinct species, inhabiting high latitudes and altitudes. Dr. Boott, in his *Illustrations*, refers it as a variety to *C. vulgaris.* It has a stouter culm than that species, with longer and broader leaves and bracts, rough upon the edges. Its perigynium is also nearly nerveless. In *Fl. Rossica* it is referred to *C. aquatilis*, Var. β. In Fries' *Summary, p.* 229, where this was described, there is evidently an omission of the syllable *di* before *stigmaticis.*

CAREX VULGARIS, Fries, Var. JUNCELLA, Fries. (*C. aquatilis*, Var. *nardifolia*, Wahl. *C. angustifolia*, Sm.) Spikelets 4–5, terminal one staminate, (stamens brick-colored,) the remainder pistillate, the upper ones approximate and the lower remote; stigmas 2; perigynium green, nerved; scale black. Spikelets, culm, and leaves all slender, the latter elongated, "convolute-filiform," (*Fries*,) or "flat and convolute," (*Boott.*)—Swedish Lapland specimens from Prof. Andersson have their leaves flat. On the shores of Cottonwood Lake in the Wahsatch, and on Provo River in the Uintas; 7–9,000 feet altitude; July. (1,241.)

CAREX JAMESII, Torr. Spikelets 5–6, the lowest sometimes pedunculate or rarely radical on a long peduncle, the two upper ones staminate, blackish-purple, (the stamens brick-colored,) the lower one small; pistillate spikelets 3, sometimes 4, oblong, cylindrical, densely flowered, the uppermost sometimes with a few male flowers; bracts leafy, not usually sheathing, the lowest sometimes short-vaginate and exceeding the culm; stigmas 2; perigynium obovate, *strongly nerved*, glaucous or light-brown, the beak bidentate or emarginate with the mouth slightly ciliated or toothed, longer than the purplish-black scale, which has a greenish-white midrib; achenium orbicular. Whole plant glaucous; culm 8–20′ high; leaves broad, leathery, shorter than the culm, amplectant at base, the lower spreading and then incurved, with pale sheaths.—From the Platte, (48 Geyer, according to Boott,) to Colorado, (James, Nuttall,) and New Mexico, (887 Fendler;) Southern Oregon, (Cronkhite, at 4,200 feet altitude;) California, Silver Valley, (Bolander, at 8,000 feet altitude.) In Diamond and Ruby Valleys, Nevada, and in the Wahsatch, near Salt Lake City; 4,500–6,000 feet altitude; May–July. (1,242.)

Var. (*C. Nebraskensis*, Dewey. *Sill. Jour.*, *n. s.*, 18. 102.) Spikelets 5–6, the two upper ones staminate with the lower one smaller, the remainder (3, sometimes 4) pistillate, short-cylindrical, densely flowered, the upper one

staminate at top, the lower short-peduncled, with leafy bracts; lower bract exceeding the culm and with a short sheath; stigmas 2; perigynium spreading, obovate or elliptical, slightly tapering at base, lenticular, apiculate, bilobed or emarginate, the orifice toothed, nerved, a little shorter than the acute or lanceolate dark-rusty scale, which has a whitish midrib. Root stoloniferous; culm 16–24′ high; leaves leathery, broad, erect, nearly equaling the culm.—The short rusty-colored spikes, more spreading perigynia, stouter culm, and more rigidly erect leaves are surely not of sufficient value to separate this from *C. Jamesii.* Fort Pierre, Nebraska, (Hayden;) Clear Creek, Colorado, (Greene.) Ruby Valley, Nevada; 6,000 feet altitude; September. (1,243.)

CAREX ——? Young specimens, with thick broad leaves, amplectant at base; spikelets 7, blackish, the terminal one staminate, the rest pistillate, increasing in length from the top to the base; perigynium elliptical, tapering at base and to a bifid beak above, mouth toothed; scales black, with a rusty-colored nerve; too young for determination. It is either new or of near affinity to *C. Jamesii*, though the perigynium seems to be nerveless. Meadow at head of Washoe Lake, Nevada; 5,000 feet altitude; May. (1244.)

CAREX LACINIATA,[1] Boott. (*C. Wilkesii*, Torr., Ms. *C. Sitchensis*, Dew., not of Presc.) Spike elongated, brick-colored (light-rusty,) with 6 cylindric elongated remote spikelets, the upper 1–2 staminate, the lower if present small, (stamens bright-rusty,) the remainder pistillate, 2½–3½′ long, densely flowered, the upper ones or all having a few staminate flowers at the apex, the lower long-peduncled, slightly nodding; lower bracts very long, with entire truncated sheath-like auricles; stigmas 2; perigynium spreading, oval or suborbicular-obovate, beaked, the mouth entire, emarginate or bifid, the apex and margins sparsely toothed, more or less nerved, rusty-punctate, lenticular-compressed, broader and shorter or longer than the lanceolate hispid-aristate rusty-colored scale, which has a broad pale nerve and a ciliated

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[1] CAREX PRESCOTTIANA, Boott. (*C. Barbaræ*, Dewey, in *Bot. Mex. Bound.*, not in Hayden's Nebraska Coll.) Spikelets 6–10, cylindrical, densely flowered, sessile, the lower somewhat peduncled, the staminate 1–2, slender, (sometimes thicker,) the rest pistillate with the fruit remote at base, the lower with long leafy sheathless bracts; stigmas 2; perigynia broadly oval, subinflated, nerved, divergent, beaked, the mouth emarginate-bidentate, ciliated, straw-colored or rusty-punctate, broader and longer than the obtuse ovate hispid cuspidate purplish 3-nerved scale. Culm 2–3′ high, triquetrous, rigid; leaves 4″ wide.—Indian Territory, on the False Washita between Fort Cobb and Fort Arbuckle, (Palmer 1852;) California, near Santa Barbara, (Parry, 1855;) the fruit young in both cases, but developed into shape. The affinity of this species seems rather to be with *C. laciniata* than with *C. crinita* as indicated by Dr. Boott.

apex; achenium ovate, rusty-olive. Culm 2-3° high, rigidly erect, triquetrous, rough above and between the spikes; the sheathing leaves long, fibrillose.—California, (Hartweg, Coulter, &c.; 529, 672, 682, 683, 1566, 2629 and 3866 Brewer, and 27 Bolander.) Banks of the Provo River, in the Wahsatch; 6,000 feet altitude; July. (1,245.)

Carex Watsoni, Olney. *New sp.* Culm 18′ high, erect, leafy; leaves clasping at base, the 2 uppermost much exceeding the culm, the lower short and sheathing; spikes 7, deep reddish-brown (claret,) the upper 4 staminate, the topmost long and the rest short, all aggregated; barren scales acute, lanceolate, hispid, aristate, membranous, deep-claret on the margins with a pale 3-nerved centre, ciliate at the apex; stigmas 2, short; perigynium deeply cleft, the bifid beak spreading and clothed with a few lax hairs; scales lanceolate, obtuse, hispid, aristate, the apex ciliate.—Washoe Mountains, on a creek-bank at the mouth of King's Cañon near Carson City; 4,500 feet altitude; May. This species has some slight resemblance to *C. Schottii*, a plant found by Dr. Parry at Santa Barbara, California, and described by Dr. Dewey in *Bot. Mex. Bound.* without the aid of stigma, style or perigynium and, I believe, without leaves, yet looking so unlike any other American form that there was little doubt that it was new to our Flora. The present plant differs from that in its staminate and pistillate scales—and in what other points who can tell? (1,246.)

Carex rigida, Good. Greenland and the Arctic Regions of America; California; Colorado; Northeastern Utah, in the Uintas, (Hayden, 1870.) Clover Mountains, Nevada; 10,000 feet altitude; September. Pursh mentions a doubtful form from hemlock woods of Vermont and New Hampshire. (1,247.)

Carex saxatilis, L. (*C. pulla*, Good.) Spikes 2–3, the staminate single, the pistillate generally remote, the lowest peduncled; bracts short, erect; stigmas 2; perigynium spreading, elliptic-globose, blackish-purple, pale at base, beaked, emarginate at the orifice, *nerveless*, longer than the obtuse ovate dark scale, which is membranous at the apex; achenium obovate, lenticular-compressed, of a pale-rusty color.—Greenland; Arctic America, according to Boott, but this last is probably *C. compacta*, a quite distinct species. Var. major. Spikes 4–5, cylindrical, bright-rusty, the staminate 2, rarely 1, slender, acute, the pistillate 2–3, subremote, thick, obtuse, the lower peduncled, sheathless and slightly nodding; stigmas 2; perigynium oblong-ovate, beaked, bifurcate, inflated, *few-* and *distinctly nerved*, suberect, reddish-brown,

(rarely straw-color,) pale at base, twice as long as the acutely ovate dusty scale, which is whitish at the apex and pale-nerved.—No ripe achenia seen. This is *C. Grahamii*, Boott, and in my opinion quite distinct from *C. saxatilis*. Rocky Mountains of British America, (Drummond.) Shore of a subalpine lake in the Uintas, with *C. elongata* and other species; 9,500 feet altitude; August. (1,248.)

Carex aurea, Nutt. Canada to Wisconsin; Arctic America; in the Rocky Mountains to California. Ruby Valley and East Humboldt Mountains, Nevada; 6–9,000 feet altitude; July–September. (1,249.)

Var. androgyna, Olney. Culms short, more rigid; leaves erect, broader; upper spikes more closely aggregated and denser flowered, the upper spike generally androgynous, having more or less fertile flowers at the top.—Pennsylvania, Presque Isle, (A. P. Garber;) Lake Superior, North Mine, (Agassiz,) Thunder Bay, (J. Macoun;) Rocky Mountains of British America, (Drummond, in Herb. Torr.;) Colorado, Dudley's Ranch, (E. L. Greene.) Uintas; 8,000 feet altitude; July. (1,250.)

Carex Magellanica, Lam. (*C. irrigua*, Sm., *Gray's Man.*) New England, New York, Pennsylvania, and Wisconsin. On the margin of a subalpine lake in the Uintas, with *C. elongata* and other species; 9,500 feet altitude; August. (1,251.)

Carex atrata, L. Mountains of California and Colorado, (Hall & Harbour, 597 Vasey.) Uintas, near head of Bear River; 10,000 feet altitude; August; also found in the Uintas by Hayden, 1870. (1,252.)

Var. nigra, Boott. Collected in Colorado by Hall & Harbour, Vasey, (596,) and E. L. Greene—by the latter in a deep swamp, at 8,000 feet altitude. Moist rocky ridges in the East Humboldt Mountains, Nevada, and in the Uintas; 9–11,000 feet altitude; August. (1,253.)

Carex Buxbaumii, Wahl. From New England and Wisconsin to Arctic America, southward along the Alleghanies, and in the western mountains to Colorado, Texas, (Wright,) and California. On a subalpine lake in the Uintas, with *C. elongata*, &c.; 9,500 feet altitude; August. (1,254.)

Carex frigida, All. Spike elongated, rusty-black, composed of 4–8 oblong spikelets, the terminal one staminate and remainder pistillate, the upper contiguous and sessile, the lower remote and exsertly pedunculate; bracts sheathing, shorter than the culm; stigmas 3; perigynium triangular, lanceolate, tapering to a beak, bifid at the orifice, nerved, smooth, hispid on

the margin, at first greenish, becoming rusty-brown, whitish at base, longer than the ovate acuminate mucronate scale; achenium oval, stipitate. Root stoloniferous, creeping; culm 8′–2° high, leafy at base; culm-leaves short, with turgid sheaths.—In the Wahsatch, Utah, (1,255,) and also doubtfully in the East Humboldt and Clover Mountains, Nevada; 9–10,000 feet altitude; August, September. (1,256.)

Carex Raynoldsii, Dewey, 1861. (*C. Lyallii*, Boott. *Illust.* 151, 1867.) Spike oblong, yellowish-purple, with 4–5 oblong spikes, the upper 3 contiguous, the lower pedunculate and remote, the terminal one staminate, sessile, the rest pistillate with a few staminate flowers at the top; bracts leafy, the lower one long, the next equal to the spikelet, not sheathing; stigmas 3; perigynium obovate or ovate, ventricose, abruptly rostrate, the orifice entire or emarginate, yellowish with the beak purple, equally nerved, smooth, divergent, coriaceous, wider and longer than the blackish-purple ovate-lanceolate more or less sharply pointed scale; achenium ovate, triquetrous.—Nebraska, Henry's Fork, at 5,000 feet altitude, (Hayden, June 1860;) Washington Territory, Cascade Mountains, (Lyall, August 1860;) California, 10–12,000 feet altitude, (1793, 1803, 1863 and 1968 Brewer; Bolander.) In the Wahsatch and Uintas; 8,500–10,000 feet altitude; July. (1,257.)

Carex Geyeri, Boott. (*C. phyllostachya*, Dew., in *Bot. Mex. Bound.*, not of Meyer.) Spike simple, androgynous, the top cylindric and staminate, pale or at length bright-rusty, with 1–5 pistillate flowers at the base, remote and erect with the rachis; stigmas 3; perigynium oval-trigonous, produced at base, short-beaked, entire at the orifice, whitish-hyaline, membranous, smooth, with two prominent nerves, shorter than the broad ovate obtuse or acute sheathing cuspidate or foliaceous scale, which is whitish with a green nerve.—California, Yosemite Valley, 7,000 feet altitude, (1635 and 3903 Brewer, 544 Torrey,) and Ukiah, (1826 Bolander;) Colorado, (598 Vasey.) In the Wahsatch on a dry wooded ridge near Salt Lake City; 5,000 feet altitude; May. (1,258.)

Carex concinna, Brown. Spikelets 3–4, rarely 5, small, few-flowered, for the most part crowded or approximate, the terminal one staminate, small, oblong, subsessile, rarely pistillate at the top or throughout, the rest all pistillate, oval, densely flowered, the lower inserted or briefly pedunculate, erect, often compound at base; sheaths short-cuspidate, or the lowest longer and leafy-subulate; stigmas 3, smooth; perigynium triquetrous, oval, atten-

uated below or obovate, beaked with the orifice emarginate, rusty or pale-green, strigose-hairy, with 2 marginal nerves, narrower and twice as long as the broad ovate obtuse purple scale, which has a broad whitish-hyaline ciliated margin; achenium stipitate and triquetrous, rusty.—Arctic America, (Richardson;) Rocky Mountains of British America, (Drummond, according to Boott;) subarctic Alaska, (Onion, Kinnicott and Hardisty.) On Cottonwood Lake in the Wahsatch; 9,000 feet altitude; July. (1,259.)

Carex Rossii, Boott. Spikelets 4–5, pale, few-flowered, the terminal one staminate, the rest pistillate, each of 3–6 alternate and distinct flowers, the upper 3 spikes approximate, the lower remote, exsertly but unequally long-pedunculate; an upper bract surpassing the culm, the lower sheathed, and all but the lower short-peduncled; stigmas 3; perigynium oval, stipitate, long-beaked, bifid, pubescent, nerveless, equaling the ovate-lanceolate acute or cuspidate scale; achenium globose-triangular, obtuse.—Rocky Mountains, latitude 52°, (Drummond;) Colorado, (620 Hall & Harbour, 592 and 592 A. of Vasey, E. L. Greene;) New Mexico, (889 Fendler.) East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 8–9,000 feet altitude; July–September. (1,260.)

Carex capillaris, L. New Hampshire, New York, and on Lake Michigan; on the Saskatchewan, (Bourgeau,) and northward, (Richardson;) Colorado, (Parry, Hall & Harbour, Greene.) On Cottonwood Lake in the Wahsatch; 9,000 feet altitude; July. (1,261.)

Carex lanuginosa, Michx. From New England to Kentucky, and north and westward to the Saskatchewan, Mackenzie River and Oregon; Colorado and New Mexico. In the Shoshone and East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–7,000 feet altitude; June–August. (1,262.)

Carex æmathorhyncha, Desv. *Fl. Chil.* 6. 224. Spikes 4, cylindric, erect, approximate, dense-flowered, the 2 upper staminate with the lower *scales obtuse*, ciliate and purple, white upon the margins, the rest pistillate and the lowest sometimes peduncled; bracts leafy, the lower equaling the culm; stigmas 3; perigynium ovate, beaked, emarginate or bidentate, clothed with long hairs, nerved, rusty-colored, pale at the base, the beak purple, shorter than or equaling the oval acuminate or acute purple scale; achenium oval, triquetrous, with the base of the style contorted.—This species seems too near *C. lanuginosa*. Dr. Boott in *Illust.* states its affinity to be with *C.*

*Beechyana.* On *p.* 207 of the same work, he thinks future observers may unite this species, *C. lanuginosa*, and others, to what he would call the typical form, *C. filiformis*, L. Mariposa, California, (in Herb. Torr., from Herb. Boott.;) New Mexico, (261 Thurber, a paler plant than usual, named *C. lanuginosa*, in *Bot. Mex. Bound.*; Dr. Palmer.) Stream-bank in the Havallah Mountains, Nevada, and near the mouth of Jordan River, Utah; 4,300–6,500 feet altitude; June. (1,263.)

CAREX ARISTATA, Brown. Arctic America and the Rocky Mountains of British America, (Richardson, Drummond;) Canada, (Macoun;) New Mexico, Fort Defiance, (Dr. Palmer.) In Ruby Valley, Nevada, and banks of the Jordan near its mouth, Utah; 4,300–6,000 feet altitude; June–September. (1,264.)

CAREX UTRICULATA, Boott. From New England to Ohio; British America, Cumberland House, (Richardson.) Ruby Valley, Nevada, and in the Wahsatch and Uintas; 6,000 feet altitude; July. (1,265.)

Var. β. MINOR, Boott. From New England to California. Ruby Valley, Nevada; 6,000 feet altitude; July. (1,266.)

Var. GLOBOSA, Olney. A form with sessile globular spikes. California, in the Sierras at 8,000 feet, (6197 Bolander.) Thousand Spring Valley, Nevada; 6,000 feet altitude; September. (1,267.) Specimens from the shore of Cottonwood Lake in the Wahsatch are interesting as showing proliferous perigynia, which give an unusual appearance to the spikelets; 9,000 feet altitude; July. (1,268.) An unusual form from Ruby Valley, Nevada, I also refer to this species; 6,000 feet altitude; August. (1,269.) *C. utriculata*, as long ago indicated by its author, has much closer affinities with *C. vesicaria* than with *C. ampullacea*.

CAREX VESICARIA, L. Oregon and California. On the margin of a subalpine lake in the Uintas; 9,500 feet altitude; August; this resembles *C. utriculata*, but differs in its staminate spike, scales and perigynium. Also on a stream bank in Huntington Valley, Nevada, having conical fruit but no ripe achenia; 6,000 feet altitude; August. (1,270.)

CAREX AMPULLACEA, Good, if restricted to the ordinary European form with canaliculate involute leaves, has no representative in these specimens from Nevada and Utah. The American specimens that I have seen of this type are from Maine, outlet of Moosehead Lake, (C. E. Smith,) Michigan, Portage River, (Prof. Porter,) and Minnesota, (Dr. J. Leidy.) There are

several forms which from their elliptic or elliptic-oblong perigynia may be referred to this species, possibly among them one from Huntington Valley, Nevada, but destitute of developed achenia. (1,271.)

## GRAMINEÆ.

ALOPECURUS ARISTULATUS, Mx. Northern States and Canada to Bear Lake; Washington Territory and California; Colorado; Indian Territory, (390 Palmer, 1868.) Valleys of Nevada, and Parley's Park in the Wahsatch; 4–6,000 feet altitude; June–September. The awn varies in length, scarcely exceeding the palet, or often nearly twice longer, but always much more slender than in *A. geniculatus*, and not deflected; culms 6–20′ high. (1,272.)

PHLEUM PRATENSE, L. Ruby Valley; meadow. Introduced. (1,273.)

PHLEUM ALPINUM, L. White Mountains; Greenland; Sitka; and at alpine and subalpine heights in the Rocky Mountains southward to Colorado and California. Moist banks in the East Humboldt Mountains, Nevada, and not rare in the Uintas; 8–9,000 feet altitude; July, August. Culms 6–15′ high. (1,274.)

VILFA CRYPTANDRA, Torr. (*Sporobolus*, Gray.) Coast of New England and on the Great Lakes; Western Iowa, (Nicolet;) and from Colorado to Texas and Western Arizona, (Ives.) West Humboldt Mountains, (562 Torrey,) and on dry hill-sides in Monitor Valley, Nevada; 5,500 feet altitude; July. Perennial; leaves spreading; axils of the panicle very often naked. (1,275.)

VILFA AIROIDES, Trin. *Steud. Gram.* 162. (*Sporobolus*, Torr.) Resembling the last, but the panicle mostly exserted, very open and spreading, the flowers all on distinct pedicels; axils naked; culms with a short thick base from an annual or perhaps biennial root; leaves usually erect and convolute.—Northern Texas and New Mexico; Colorado; California. On the Truckee River, Nevada, and on Carrington Island in Salt Lake; 4–4,300 feet altitude; June–August. (1,276.)

VILFA ASPERIFOLIA, Nees & Meyen. *Steud. Gram.* 160. (*Sporobolus*, Thurb.) Culms branching at base from running rootstocks, decumbent and often rooting, 6–15′ long, glabrous; the smooth naked sheaths equaling or exceeding the internodes; leaves flat, very rough upon the margins, acuminate, 1–3′ long, and 1″ broad, the lowermost sheaths leafless; panicle very loose and spreading, 3–6′ long, sheathed at base, the branches mostly solitary

and axils naked, the branchlets and long capillary pedicels very scabrous; spikelets less than 1″ long, frequently 2-flowered, the glumes slightly unequal, hispid upon the back, acute, a third shorter than the nearly equal palets; lower palet submucronate, the upper obtuse.—The specimens accord very well with the description of the Chilian plant, and also much resemble forms of *Eragrostris capillaris.* Mono Lake, California, (6095 Bolander;) Colorado, (641 Hall & Harbour, 630 Vasey;) also 571 and 571[a] Torrey, from Western Nevada. On alkaline soils in Carson, Unionville and Ruby Valleys, Nevada; 4–6,000 feet altitude; August-October. (1,277.)

VILFA RAMULOSA, HBK. *Steud. Gram.* 158. (*Sporobolus*, Kth.) Root annual, fibrous; culms very slender, branching from the base, 3–10′ high; sheaths usually exceeding the internodes and glabrous or slightly hairy; leaves flat or convolute, 1–2′ long, ¼–1″ wide, recurved, roughish; panicle elongated, often sheathed at base, very loose and spreading, with scattered branchlets; spikelets scarcely ½″ long, obtusish, on capillary pedicels; glumes nearly equal, minutely hairy upon the margin or naked; palets obtuse, nearly twice longer.—Mono Lake, California, (6096 Bolander;) Colorado, (643 Hall & Harbour.) Banks of the Truckee River; Nevada; 4,000 feet altitude; July. (1,278.)

VILFA DEPAUPERATA, Torr. *Hook. Fl. Bor.-Amer.* 2. 257, *t.* 236. Root perennial, creeping; culms ascending, appressed-branched, slender, often geniculate, glabrous, striate, rather rigid, ½–2° long; leaves 1–3′ long, narrow and usually convolute, spreading or recurved; panicle very slender and contracted, 1–3′ long, compound or often nearly simple; spikelets small; glumes unequal, ovate, obtuse or acutish, membranous, two-thirds the length of the acute lower palet, which is more or less obscurely 3-nerved.—Resembling *V. cuspidata* and scarcely differing except in the shorter obtuse glumes of the rather smaller flowers. Lower palet a little more than 1″ long, glabrous or slightly scabrous on the midnerve, the upper one obtuse or erose at the summit, not seen bifid as described and figured by Hooker. From Western Texas and New Mexico to Colorado and the Saskatchewan; California. Ruby and Huntington Valleys, Nevada, abundant and forming a dense turf; also in Washoe and Carson Valleys, (563 and 566 Torrey;) 4–6,000 feet altitude; July, August. (1,279.)

Var. FILIFORMIS, Thurber, Ms. Culms low and very slender, 2–8′ high; panicle about 1′ long and nearly simple; glumes shorter, less than ½″

long; lower palet acute, cuspidate or even short-awned, minutely pilose upon the midvein and margin.—Yosemite Valley, California, (6091 Bolander,) and near Donner Lake, (565 Torrey.) East Humboldt Mountains, Nevada, at 7,000 feet altitude, (1,280,) and the short-awned form (1,281) in the Uintas, Bear River Cañon, at 8,000 feet altitude; August, September. The Californian specimens are mostly annual.

Agrostis scabra, Willd. From Florida to Canada, the Saskatchewan and Bear Lake, and west to Arkansas, Kansas and Dakota; Unalaska; California. East and West Humboldt Mountains and in Ruby Valley, Nevada; 5–7,000 feet altitude; August, September. (1,282.)

Agrostis exarata, Trin. *Steud. Gram.* 165. Root biennial, fibrous; culms simple, erect, 1–2° high; ligules obtuse, 1–2″ long; leaves flat, linear, (1–3″ wide, 2–4′ long,) the radical ones narrower; somewhat scabrous; panicle usually contracted and dense, 2–4′ long, the rays 3–5 or more at each axil, semi-verticillate, flowering from the base, erect; glumes acute or subacuminate, scabrous on the back, slightly unequal, 1–2″ long; lower palet usually nearly a half shorter, erose-truncate, very rarely awned above the middle, glabrous or a little hairy at base, the upper one a little smaller than the ovary.—Sitka and Unalaska, and from Washington Territory to California; Colorado, (664 Vasey,) Arizona and New Mexico. East and West Humboldt Mountains, Nevada, on stream-banks; 5–6,000 feet altitude; August, September. (1,283.)

Var. (*A. microphylla*, Steud. *Syn. Gram.* 164. Torrey, *Pac. R. R. Surv.* 4. 154.) Leaves and sheaths scabrous; glumes nearly equal, tapering to a long slender point, the lower one rough on the keel; lower palet less than half as long as the glumes, truncate with 4 short teeth at the summit, awned a little below the middle with a bent scabrous bristle, equaling or more frequently twice longer than the glumes, rarely wanting; upper palet small or nearly obsolete; callus somewhat bearded.—An examination of numerous specimens in Herbs. Torrey. and Eaton. seemed to show this to be distinct from the last species, though approaching it and both forms quite variable. Dr. Bolander, however, is confident of their identity. Common in California. On the Truckee River and in the West Humboldt Mountains, Nevada; 4–5,000 feet altitude; July–November. (1,284.)

Agrostis canina, L. Maine to New York and in the mountains southward to North Carolina; Greenland, (Kane;) Sitka, (Bongard;) Wash-

ington Territory, (Tolmie;) California, (6472 Bolander;) Colorado, (673 Hall & Harbour.) Clover Mountains, Nevada; 11,000 feet altitude; September. A dwarf alpine form, 2–5′ high, the glumes and palets dark-purple. (1,285.)

AGROSTIS ELATA, Trin. (?) 559[a] Torrey, collected near Lake Washoe, Nevada, is very nearly this species, which, however, has been found only eastward, in swamps, from New Jersey to North Carolina.

POLYPOGON MONSPELIENSIS, Desf. A single specimen of what seems to be this species, 2–3′ high, was collected near Unionville in the West Humboldt Mountains, Nevada. Frequent in California from Mt. Tejon northward; perhaps indigenous. (1,286.)

MUHLENBERGIA GLOMERATA, Trin. From the Northern States and Arkansas to the Saskatchewan, Rocky Mountains of Oregon, Idaho and New Mexico. East Humboldt Mountains and Goose Creek Valley, Nevada; 6,000 feet altitude; September. (1,287.)

MUHLENBERGIA SYLVATICA, T. & G. Var. (?) SETIGLUMIS. Culms 1° high, nearly erect; panicle contracted nearly as in *M. glomerata*, the branches solitary and densely flowered, mostly to the base; glumes attenuate into a scabrous bristle, 2½–3″ long; the palet, with its awn, about twice longer.—Near warm springs in Humboldt Pass, Nevada; 6,000 feet altitude; September. (1,288.) The typical form of the species has not hitherto been collected beyond the limits of Gray's Manual, though several Texan and New Mexican forms (*M. monticola* and *pauciflora*, Buckley, &c.) have been referred to it.

VASEYA[1] COMATA, Thurb. *Proc. Acad. Phil.*, March, 1863, *p.* 79. Culms 1–2° high, erect, slender, glabrous, leafy, the nodes puberulent; sheaths and leaves scabrous; ligules short; leaves linear, flat, 3–4′ long and 2″ wide, mostly erect; panicle 3–4′ long, usually purplish and shining, the branchlets puberulent, solitary, branched and densely many-flowered to the base; spikelets short-pedicelled; glumes very narrow, 1½″ long, acuminate, slightly scarious on the back; palets 1″ long, the rough awn 2–5″ in length.—With wholly the habit of a *Muhlenbergia* and distinguishable only by the longer hairs surrounding the base of the flowers. Nebraska and Colorado; Sierras

[1] VASEYA, THURBER. Spikelets 1-flowered, membranous-herbaceous, in a narrow crowded panicle. Glumes 1-nerved, equaling or exceeding the flowers, nearly equal, the lower usually a little longer. Callus oblique, densely bearded with silky hairs equaling the flower. Palets equal, the lower 3-nerved, attenuate into a long awn, the upper acuminate. Stamens 3. Ovary stipitate. Stigmas plumose with long simple hairs.—Perennial from running rootstocks.

of California. Creek-banks in Huntington Valley, Nevada; 6,000 feet altitude; August. (1,289.)

CALAMAGROSTIS STRICTA, Trin. New England and Canada to the Saskatchewan; Greenland, (Kane,) and Behring Strait; Minnesota, (Nicolet,) Colorado, (Hall & Harbour,) and Washington Territory. Stream-banks in the East and West Humboldt Mountains and Diamond Valley, Nevada, and in the Salt Lake and Bear River Valleys, Utah; 4,300–6,500 feet altitude; June–September. Panicle larger and less strict than described. The species is referred by Munro to *C. Lapponica.* (1,290.)

CALAMAGROSTIS SYLVATICA, DC. *Gray's Revis. Calam., Proc. Amer. Acad.* 6. 80. Root creeping; culm simple, erect, rather rigid, glabrous or scabrous below the panicle; leaves mostly revolute, scabrous; panicle contracted, 2–4′ long, the branchlets erect; glumes ovate-lanceolate, sharply acuminate, about 3″ long; lower palet scabrous, rather rigid, awned near the base, hairs about one-fourth as long as the palet; rudiment elongated, plumose; awn bent and twisted, exceeding the glumes.—Arctic Coast, the Saskatchewan region, and in the Rocky Mountains to Colorado; California. East Humboldt Mountains; 10,000 feet altitude; August. (1,291.)

ERIOCOMA[1] CUSPIDATA, Nutt. Perennial; culms 1–2° high, simple, rather rigid and somewhat scabrous; sheaths scabrous, equaling the internodes, the upper ones often dilated; leaves narrow, convolute, elongated, (2–18′;) panicle frequently included at base, dichotomously branched, the spikelets solitary upon capillary peduncles; glumes 2½–4″ long, usually more or less purple, pubescent; outer palet deep brown, 1½″ long, the nearly straight triquetrous awn 1½–2″ long.—From New Mexico to Northern Dakota and the Saskatchewan, and west to Arizona, California and Oregon. A frequent and valuable "bunch grass" through Nevada and in Utah, at 4–8,000 feet altitude; June–October. Growing in the dryest soils, and retaining its seeds through the season. (1,292.)

STIPA SPARTEA, Trin. From Illinois and Northern Michigan to the Saskatchewan and Upper Missouri, and in the Rocky Mountains, (Lyall.) Reese

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[1] ERIOCOMA, NUTT. Spikelets 1-flowered, in a loose open panicle. Glumes thin, nearly equal, strongly 3-nerved, subventricose at base, attenuate-rostrate above, somewhat exceeding the persistent flower. Callus short, thick. Palets rigid, coriaceous, the outer oval, densely covered throughout with long white silky hairs, and terminated with a short stout deciduous awn, the upper included, narrower, scarcely shorter. Stamens 2–3; anthers oblong-linear, bearded at the apex. Scales conspicuous, nearly equaling the oblong seed.—Steudel in his description of Fendler's specimen, (under *Fendleria,*) describes a neuter floret as a single very thin palet, much narrower and shorter than the glumes. This is usually only indicated by a very short and thick process at the base of the upper palet.

Valley and in the East Humboldt Mountains, Nevada; 5–7,000 feet altitude; July. (1,293.) Quite variable in the length of the glumes, (8–20″,) palet, (4–10″,) and awn, (2½–8′.) Leaves and nodes never pubescent, lower palet rather spreading-pilose, the awn twice geniculate, usually pubescent toward the base. The species seems not to extend southward. In Texas and New Mexico *S. Neesiana*, Trin., (*S. setigera*, Presl., and probably also *S. ciliata*, Scheele, and *S. leucotricha*, Trin.,) takes its place, a rather smaller grass with more slender culms, pubescent upon the leaves and nodes, and the palet fimbriate-crowned; collected by Wright, and 980 Fendler, (but near *S. spartea*,) and also occurring in California.

Stipa comata, Trin. *Steud. Gram.* 130. It is not easy to find constant characters to distinguish this species from *S. spartea*, other than the always elongated (6–8′) once-geniculate awn, glabrous toward the base or with a single pubescent line, very slender and much curled and twisted; panicle always sheathed at base, the branchlets with but 1–2 spikelets; palet 5–8″ long, the hairs more silky and appressed. On the Saskatchewan, and on the Upper Missouri from Dakota to Northern Idaho, and southward. Mono Lake, California, (Bolander.) Foot-hills of the Truckee Range, Western Nevada, and on Stansbury Island in Salt Lake; 4–5,000 feet altitude; May. (1,294.)

Stipa viridula, Trin. *Steud. Gram.* 129. Culms stout, strict, and with the narrow sheaths scabrous or sometimes glabrate, 1–3½° high, the nodes naked; leaves elongated, mostly narrow and involute, 1–3″ broad, scabrous; panicle narrow, contracted, 3–10′ long, the erect branches 2–3 together, flowering from the base or some of them naked below; glumes nearly equal, 3–4½″ long, narrowly acuminate; lower palea 2½–3″ long, short-pilose at the obtusish base, appressed-pubescent above, and with a pilose crown at the apex; awn about 1′ long, twisted and geniculate, minutely scabrous.—From the Saskatchewan to Arkansas, Colorado and New Mexico; California, (Bolander.) 849 Fendler and 349 Gregg are a very stout form with large and dense panicles. East and West Humboldt Mountains, Nevada; 8,000 feet altitude; August. (1,295.)

Stipa occidentalis, Thurb., Ms. in Bol. Coll. Culms 1–2° high, slender, with the narrow sheaths somewhat scabrous; nodes naked; leaves very narrow, flat or mostly involute, rough on the margin; panicle often sheathed at base, contracted, few-flowered, 2–6′ long, the branches in pairs, 2–4-flowered; glumes 5″ long, purplish, a little unequal, acuminate; lower palet 3½″ long,

silky-pubescent especially at base, the callus short and acute; awn 1½′ long, twisted and geniculate, densely pilose below, scabrous above.—Yosemite Trail, California, (5038 Bolander.) Pah-Ute Range, Nevada; 5,000 feet altitude; June. (1,296.)

STIPA MONGOLICA, Turcz., (648 Hall & Harbour,) will probably be found in Eastern Utah; slender, 1° in height, with filiform leaves and a loose few-flowered panicle; the membranous glumes obtuse, about 2″ long, subequal, purplish, and the scarcely shorter hairy palet ending in a bent plumose awn, 6″ in length. An easily recognized species. A third plumose-awned *Stipa* occurs in New Mexico, (981 Fendler,) with long setaceous-acuminate glumes, 2″ in length, the palet 6–8″ and the awns as many inches long. This has been considered by Prof. Thurber a variety of *S. pennata*, L.

ARISTIDA PURPUREA, Nutt. *Steud. Gram.* 134. Perennial; culms 6–15′ high, simple, erect, slender, mostly glabrous; sheaths narrow, scabrous, exceeding the internodes, pilose at the throat; leaves very narrow, convolute, ½–10′ long; panicle slender, erect or flaccid, 3–6′ long, loosely few-flowered; glumes purplish, the lower 6–9″ long, about twice exceeding the lower, and longer than the flower, bifid and shortly awned; flower densely short-pilose at the pointed base, scabrous above, 6″ long, the awns equal or nearly so, separate to the base, not jointed, 1–2″ long, scabrous.—From Western Texas and New Mexico to Arkansas and Colorado; Arizona. Antelope Island in Salt Lake, and on foot-hills near Salt Lake City; May, June. *A. Fendleriana*, Steud., is the same, and perhaps also his *A. longiseta*, judging from the description. (1,297.)

SPARTINA GRACILIS, Trin. *Steud. Gram.* 214. Culms 1–3° high, exceeding the spreading distichous leaves, which are very rough upon the margins, mostly convolute, the upper ones distant and shorter; ligules ciliate; spikes 4–10, oblong, mostly sessile, appressed to the nearly smooth rachis; glumes very unequal, the lower acuminate, the upper acute and equaling the obtusish palets, 4″ long, the glumes and lower palet ciliate-hispid upon the keel.—Texas and Colorado. Frequent in alkaline meadows throughout Nevada; 4–6,000 feet altitude; June–October. (1,298.)

PLEURAPHIS[1] JAMESII, Torr. *Steud. Gram.* 218. Roots perennial,

[1] PLEURAPHIS, TORR. Flowers spicate, the spikelets sessile by threes at each joint of the rachis, surrounded at base by an involucre of soft spreading hairs, the lateral ones staminate, the central perfect. Glumes of the perfect spikelets 2, 1-flowered, equal, narrow-cuneate, deeply 2-cleft, 3–5-bristled; palets membranous, the lower short-awned at the apex. Glumes of the sterile spikelets 2, 2-flowered, lanceolate, inequilateral, the lower 1-awned upon the back; palets membranous, awnless. Stamens 3, with very short filaments. Germ ovate; styles 2, distinct, the elongated stigmas simply plumose.

creeping; culms 1–1½° high, branching at base, erect, slender, slightly scabrous, hairy at the nodes, with the leaves glaucous; sheaths close, scabrous, hairy at the throat, the stipule laciniate; leaves 1–6′ long, mostly convolute, rigid, scabrous, the upper ones short and pungent; spike 2–3′ long, erect, the internodes of the flexuous rachis shorter than the erect (4″ long) spikelets; flowers short-pedicelled or nearly sessile in the glumes; glumes of the perfect spikelet ciliate, carinate, cleft nearly to the middle, the lobes 1-nerved on the inner margin, with 3–5 intermediate bristles, the central one longer; palets exceeding the glumes, the lower 3-nerved, bifid at the apex, short-cuspidate, the upper a little shorter, 2-nerved and slightly bifid; scales linear, entire; glumes of the sterile spikelets equaling the palets, the lower ciliate, slightly 2-cleft, awned above the middle, the outer side 2-nerved, the inner margin much narrower and infolded, the upper glume emarginate or erose, cuspidate with a strong midnerve, the broader outer side also 2–3-nerved; palets emarginate or irregularly toothed at the apex, the lower 3-nerved, the upper 2-nerved.—The specimens differ from the original description and figure in having the palets less distinctly toothed and the glumes occasionally with but 3 bristles. Northern Texas and Indian Territory to New Mexico and Western Arizona. Monitor Valley, Nevada, and on Carrington Island in Salt Lake; 4,500–5,500 feet altitude; June, July. (1,299.)

Eremochloe[1] Kingii. Very low and tufted, 1–3′ high, nearly glabrous;

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[1] EREMOCHLOE. Panicle short and contracted, simple or nearly so. Spikelets 4-flowered, the two lower flowers neutral, the uppermost reduced to a stipitate villous triple awn. Glumes 2, membranous, carinate, 1-nerved, acute, glabrous, rather exceeding the flowers, the lower a little the shorter. Palets membranous, the lower 2-cleft to the middle, 3-nerved, the nerves strongly villous, produced and aristate, the middle one longest, the lobes in the neutral florets obtuse, in the perfect flower attenuate; upper palet shorter, bicarinate, 2-nerved, 2-lobed or 2-toothed at the apex, imperfectly developed in the neutral florets. Stamens 2. Styles 2, the elongated stigmas very minutely hairy. Grain free, sessile, obovate, smooth.—Low biennial desert grasses, with fibrous roots, the sheaths bearded at the throat and often ciliate, the leaves short, rigid, revolute-setaceous, striate and pungent.

Closely allied to the section *Triplasis* of *Tricuspis*, but the neutral florets at the base of the spikelets, with the upper palet imperfectly developed, the nearly naked stigmas of the single perfect flower, and the peculiar rudimentary terminal floret, seem sufficient grounds for its separation. An earlier known species, first collected by Wright (2028) on the Rio Grande in Southern New Mexico, was afterwards collected in the same region by Bigelow and recognized by Prof. Thurber as distinct from *Tricuspis*, but has remained hitherto unnamed and unpublished. A description and figure are appended.

Eremochloe Bigelovii. Taller, 6–10′ high, glabrous, the culms erect from a leafy branching tufted base, naked with 2–3 approximate leaves below the panicle; sheaths not ciliate; panicle subsimple, ½–1′ long; spikelets short-pedicelled, the flowers nearly as in *E. Kingii;* glumes 3″ long, rather obtuse; lower palets of the neutral flowers slightly longer, (2½″ long,) the upper also longer, linear, with short obtuse lobes; lower flower with a delicate very narrowly linear scale (?) exceeding the upper palet; upper palet of the perfect flower rather narrower, with deeper acute entire lobes. Plate XL. Fig. 1. A single stem; natural size. Fig. 2. Glumes. Fig. 3. Neutral florets. Fig. 4. A lower palet. Fig. 5. Upper palet of lower flower, with the elongated scale. Fig. 6. Upper palet of second flower. Fig. 7. Perfect floret and terminal rudiment. Fig. 8. Upper palet of perfect flower. Fig. 9. Mature seed; all magnified four diameters.

sheaths ciliate, dilated; leaves 6–9″ long; panicle short, spicate, usually sheathed at base; spikelets few, glumes 3½″ long, acuminate, purplish; lower palet of the nearly sessile florets 2″ long, very villous at base, lobes rounded at the apex, lateral nerves marginal and but shortly produced; upper palets one-half shorter, oblanceolate, acutely 2-lobed at the apex, the nerves obscure, marginal and slightly ciliate, the palet of the lower flower the larger; lower palet of the perfect flower similar but naked at base, the lateral lobes narrower and attenuate upward, the middle awn somewhat margined above the sinus; upper palet ovate, 2-lobed at the apex, the lobes rounded and irregularly short-serrate.—Found on dry barren foot-hills of the Trinity Mountains, Nevada; 4,500 feet altitude; May; also found by Dr. Torrey on foot-hills east of Carson Sink. PLATE XL. Fig. 10. A plant; natural size. Fig. 11. Glumes. Fig. 12. Lower neutral florets. Figs. 13 and 14. Their upper palets. Fig. 15. Perfect flower and terminal rudiment. Fig. 16. Upper palet; all magnified four diameters. (1,300.)

KŒLERIA CRISTATA, Pers. From Pennsylvania to Illinois and the Saskatchewan, thence south and westward to Arkansas, Northern Texas, Colorado, Utah, Northern California and Washington Territory. Antelope Island in Salt Lake, and in the Wahsatch; 4,500–6,000 feet altitude; June. (1,301.)

EATONIA OBTUSATA, Gray. From Pennsylvania to Florida and westward to Wisconsin and the Saskatchewan, Arkansas and Texas; Mono Lake, California, (Bolander.) Truckee and East Humboldt Mountains, Nevada; 5–6,500 feet altitude; July, August. (1,302.)

MELICA POÆOIDES, Nutt. *Plant. Gambel., Jour. Acad. Phil., n. s.,* 1. 188. Culms erect, slender, 1½–2° high, often enlarged and bulb-like at base, slightly scabrous above, nodes naked; sheaths longer than the internodes and scabrous, the ligules usually long and lacerated; leaves scabrous, mostly flat and elongated, 1–2″ wide; panicle narrow and often interrupted, the branches unequal and erect, subscabrous, rarely spreading; spikelets erect and scarcely secund, 3–5-flowered, usually more or less purple; glumes obtuse or acutish, glabrous, 5-nerved; lower palet about 4″ long, 7-nerved, puberulent on the back, membranous-margined, rather obtuse; upper palet pubescent on the nerves, erose-truncate; grain 2″ long.—The spikelet is at first close and little longer than the glumes, becoming more open and somewhat longer. The lower palet is described by Nuttall as but 5-nerved. California to Oregon,

(11 Geyer.) In the East and West Humboldt Mountains, Nevada, and in the Wahsatch; 7–10,000 feet altitude; July–September. (1,303.)

What seems to be merely a reduced form was also collected, 1° high and very slender, with the leaves narrow and revolute, the panicle very narrow and with but 10–15 spikelets. This is nearly 621 Hall & Harbour, from Colorado, which, however, has the glumes more acute and the culms less decidedly enlarged at base, and was collected also by Bourgeau at the east base of the Rocky Mountains. (1,304.)

Melica stricta, Bolander. *Proc. Calif. Acad.* 3. 4. Culms 6–18′ high, slender, erect, purple at base, slightly scabrous above; nodes smooth, covered; sheaths and leaves pubescent; ligules broad, entire or lacerate; panicle interrupted, secund, the branchlets in pairs or solitary, pubescent and strongly curved above, bearing a single nodding spikelet; glumes 2–4-flowered, purplish, nearly equal, thin and membranous, glabrous, obtuse, 6″ long; lower palet rather more rigid, slightly puberulent on the back, 7-nerved, obtuse or acutish, 5″ long; upper palet nearly half shorter, pubescent on the nerves.—Yosemite Valley. Not rare on the mountain ranges of Nevada; 5–10,000 feet altitude; May–September. (1,305.)

Glyceria pauciflora, Presl. *Steud. Gram.* 285. Roots creeping; culms 1–3½° high, smooth, nodes naked; sheaths and the broad-linear leaves (3–12′ long) scabrous; panicle loosely spreading, the slender flexuous branches in pairs, divided, scabrous; spikelets narrow-oblong, 2″ long, 4–6-flowered, often purplish; glumes rounded, unequal, the lower obscurely 3-nerved, scarious on the margin, lower palet truncate-obtuse, the apex minutely serrulate and distinctly scarious, 5-nerved, the upper one emarginate.—Described by Presl as near *G. fluitans*, but it much more closely resembles *G. aquatica*. Frequent in Oregon and Washington Territory and extending eastward to Colorado, (662 Hall & Harbour;) specimens from Mendocino County, California, have the rounded apex of the lower palet frequently abruptly acute. Bear River Cañon in the Uintas; 8,000 feet altitude; August. (1,306.)

Glyceria aquatica, Smith. From New York to Wisconsin, Lake Winnipeg and the Saskatchewan region, and in the Rocky Mountains southward to Colorado; Oregon; California. Ruby and Huntington Valleys and in the Clover Mountains, Nevada, and in Salt Lake Valley, Utah; 4,500–6,500 feet altitude; June–September. (1,307.)

GLYCERIA DISTANS, Wahl. (*Atropis*, Griseb.) The specimens differ from European ones only in their more starved habit, the leaves being often short and convolute. The upper glume is $\frac{3}{4}''$ long, twice the length of the lower one; lower palet 1″ long, slightly pubescent at base; culms 6–18′ high; branches of the panicle spreading, or often short, simple and erect. 615 Vasey, from Colorado, is apparently distinct, the palets being more acute, the upper equaling or exceeding the lower, and the leaves elongated-filiform. In salt marshes on the coast of the Northern States; from the Saskatchewan (Bourgeau) to Slave Lake, (Richardson,) and southward to Colorado and New Mexico, (927 Fendler,) Washington Territory, (Scouler,) and California. Found near the sink of the Humboldt, Nevada, and in salt meadows near the mouth of the Jordan, Utah; 4,300 feet altitude; May–August. (1,308.)

CATABROSA[1] AQUATICA, Beauv. (*Glyceria*, Presl. *Steud. Gram.* 286.) Culms 4′–2° high, rather stout, ascending; leaves 2–6′ long, 2–4″ wide, scabrous on the margin; panicle uniform, branchlets numerous, divided; glumes $\frac{1}{2}''$ long, purplish; flowers 1″ in length, light-brown in color.—Greenland, (Kane,) and from Hudson's Bay to the Rocky Mountains; Dakota; Columbia. Wahsatch and Uintas; 6,500–8,000 feet altitude; June–August. (1,309.)

BRIZOPYRUM SPICATUM, Hook., Var. STRICTUM, Gray. (*Uniola stricta*, Torr. *Steud. Gram.* 281.) Spikelets many-flowered, and the panicle mostly rather loose and elongated, $1\frac{1}{2}$–$3\frac{1}{2}''$ in length; culms $\frac{1}{2}$–2° high; pistillate spikelets 4–8″ long, 4–13-flowered, the lower palet acutish or almost acuminate; staminate spikelets 4–9″ long, 6 18-flowered, slender-pedicelled and often somewhat nodding.—Running into *B. spicatum* by intermediate forms. An abundant grass in alkaline or saline meadows of Nevada, but innutritious and injurious to animals from the amount of saline matter usually encrusting it. From Texas to the Upper Missouri and the Saskatchewan and westward to the Pacific. (1,310.)

POA ANNUA, L. Wahsatch Mountains, near Salt Lake City; possibly introduced. (1,311.)

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[1] CATABROSA, BEAUV. Spikelets 2–3-flowered; flowers equal, perfect. Glumes membranous, colored, unequal, shorter than the flower, concave, the lower oblong, 1-nerved, the upper obovate, 3-nerved, erosely dentate at the apex, or both nerveless. Palets membranous, equal in length, the lower 3-nerved and 3-keeled, truncate-obtuse, the upper 2-nerved and 2-keeled, rounded and somewhat 3-lobed. Stamens 3. Styes 2, very short, the stigmas plumose. Scales 2, shorter than the ovary. Grain oblong, free, shortly pedicelled.—Glabrous creeping aquatics, with flat leaves, elongated membranous ligules and diffusely branched panicles with semi-verticillate branches; flowers jointed at base and deciduous.

Poa alpina, L., Var. (?) Glaucous and more or less scabrous throughout, stout and tufted; culms 4–15′ high; leaves erect, rather thick, the cauline and often the radical ones very short; panicle, 1½–3′ long, close, the branches nearly sessile, erect or somewhat nodding; upper glume 1¾–2½″ long, slightly scabrous on the midvein; lower palet 2½″ long, more or less villous-pubescent at base, obtuse; perfect grain over 1″ long.—The two forms, one with erect rather close panicles, and the other rather loose and nodding, are distributed under separate numbers, (1,312 and 1,313.) The ordinary smoother forms of the species show the glumes and the palets but 1½″ or even less in length. Greenland and Labrador; Northern Maine and Lake Superior, and from the Saskatchewan to Bear Lake and the Rocky Mountains; Colorado; California, (5068 Bolander.) The variety was collected in the West Humboldt, Clover, and East Humboldt Mountains, Nevada; 8–11,000 feet altitude; June–September.

Poa cæsia, Sm., near Var. strictior, Gray. A low slender form, with a rather contracted panicle of small flowers, 1″ or less in length. It is also near forms of *P. laxa*, Hænke, which Munro makes identical with *P. flexuosa*, *P. arctica*, etc., and from which it differs chiefly in its scabrous panicle. From Northern Wisconsin north and westward. Uinta Mountains above the head of Bear River; 12,000 feet altitude; August. (1,314.)

Poa serotina, Ehrh. Culms tufted, 18′ high, smooth; leaves narrowly linear, scabrous; ligules short; panicle pyramidal, very loose and spreading, 3–8′ long; branches in fives, capillary, a little scabrous; spikelets purplish, 3–4-flowered; glumes acute, 1¼″ long; lower palet slightly webbed at base, 1¼″ in length.—The same as 672 Hall & Harbour from Colorado, (named by Godet in letter to Dr. Gray, *P. Hallii*,) though with a larger and wider panicle, and not differing from numerous specimens in Herb. Gray. This species, as well as *P. cæsia*, Sm., is referred by Munro in Hooker's *Arctic Flora* to *P. nemoralis*, L. From New England and Canada west to Washington Territory, northward to the Slave River and Behring Strait and south to Colorado. On the Bear River in the Uintas; 7,000 feet altitude; August. (1,315.)

Poa flexuosa, Muhl. (?) From Virginia to Florida and west to Kentucky; specimens collected in the Wahsatch near Salt Lake City are referred here, though of a somewhat different habit; 5,000 feet altitude; May. (1,316.)

Poa Eatoni. Allied to the last. Culms smooth, 1½–2° high; sheaths

and leaves scabrous; leaves mostly radical and narrower, 1–2″ wide, 3–6′ long, the cauline few and very short or nearly obsolete; ligule short; panicle loose and spreading, the short (1′ long or less) branches in pairs or solitary; spikelets 3–5″ long and 1½″ broad, 4–6-flowered, purplish; glumes acutish; palets very villous on the back and margins, obtuse and carinate, but less flattened and less strongly nerved than in the last.—Found by Prof. Daniel C. Eaton in a rocky gulch of Cottonwood Cañon in the Wahsatch; 6,000 feet altitude; June. Very similar specimens have also been collected by Dr. Bloomer near Virginia City, Nevada.

POA (?) KINGII. Culms rather stout and strict, 12–20′ high, and with the sheaths glabrous; leaves 2–10′ long, 2″ wide or more, subscabrous; ligules short or nearly obsolete; panicle nearly glabrous, 2–4′ long, erect and strict, more or less interrupted, the branches often solitary, short, bearing 1–3 spikelets; glumes 2–4″ long, membranous, acute, smooth, 3–5-flowered; lower palet puberulent, not villous nor webby, 3″ long, acute, the upper one roughly short-ciliate on the keels; scales large and distinct, nearly equaling the ovary, ciliate; the strongly plumose stigmas mostly long and conspicuously exserted; ovary 1″ long, bearded above.—A very strongly marked species, but not wholly agreeing with the characters of the genus. Frequent on the East Humboldt Mountains, Nevada; 7,500–10,000 feet altitude; July–September. (1,317.)

POA TENUIFOLIA, Nutt., Ms. in Herb. Tufted, 1–2° high; culms slender, erect; glabrous, or with the sheaths and leaves more or less scabrous; leaves narrowly linear, 1–6′ long; ligules short; panicle erect, narrow and rather close, 2–6′ long, the branchlets 2–5 together and scabrous; glumes 2–2¼″ long, acute or acutish, a little scabrous on the midvein, 3–4-flowered; lower palet 2″ long, obtuse, nearly glabrous, puberulent or somewhat pubescent at base, but little compressed; flowers readily separating at the joints.—Like the following an ambiguous species, intermediate between *Glyceria* and *Poa*, but apparently more nearly allied to the latter genus, in which they are here provisionally retained under old Nuttallian names. It is the same as 668 and 675 Hall & Harbour, (distributed as *Atropis Californica*, Munro,) and is apparently common from Colorado to Oregon and Washington Territory. It is one of the most abundant as well as the most valuable of the "bunch" grasses of Nevada. The grain, though small, is extensively gathered by the natives for food. Occurring on the foot-hills and mountains, less frequently

in the lower valleys, from the Sierras to the Wahsatch; 4–8,000 feet altitude; June–September. The Californian grass, (2035 Hartweg,) upon which Munro's still undescribed species *Sclerochloa Californica* was founded, and the similar 43 Bolander, distributed as *Atropis Californica*, Munro, *ined.*, are somewhat different, as has been remarked by Dr. Gray, and are probably distinct. (1,318.)

Poa Andina, Nutt., Ms. in Herb.; (not of Trin.) In dense perennial tufts, glabrous excepting the more or less scabrous panicle; culms 4–12′ high, slender, erect; leaves very narrow, 1–3′ long, mostly revolute; ligules ½–2″ long, acuminate; panicle narrow or linear, strict, 1–2½′ long, the branches 2–3 together; spikelets 2–3-flowered; glumes 1½–2″ long, acute or acutish, a little scabrous on the midvein; palets 1½″ long, pubescent, villous at base, the lower one obscurely nerved, but little compressed.—Colorado. East and West Humboldt Mountains and in the Clover Mountains, Nevada; 8,500–11,000 feet altitude; also in the Trinity Mountains at 4,500 feet altitude; May–September. (1,319.)

Eragrostis poæoides, Beauv., Var. megastachya, Gray. Salt Lake Valley, near Brigham City. Introduced. (1,320.)

Eragrostis Purshii, Bernh. From New Jersey through the Southern States to Louisiana; New Mexico. On the banks of the Truckee River, Nevada; 4,000 feet altitude; July. (1,321.)

Festuca tenella, Willd. From New York to Florida and westward to the Upper Missouri and Texas; California. Trinity Mountains, Nevada, and in Salt Lake Valley and on Antelope Island, Utah; 4–4,500 feet altitude; May, June. Awns nearly equaling the palet. (1,322.)

Festuca microstachys, Nutt. *Plant. Gambel.*, *Jour. Acad. Phil.*, *n. s.*, 1. 187. Annual or biennial; culms slender, erect, 4–15′ high; sheaths pubescent or smooth; leaves convolute-bristleform; panicle 1–6′ long, strict and spikelike or more frequently with the secund branchlets and spikelets spreading or cernuous; pedicels short and clavate-thickened; spikelets 1–5-flowered, pubescent or scabrous or even glabrous; glumes 1½–3″ long, acute, the upper but little exceeding or nearly twice longer than the lower one; palet 2–3″ long, with the awn 3–5″ in length.—A quite variable species, described by Nuttall from the pubescent few-flowered form; frequent in California. The present specimens are open-panicled, with glabrous or scabrous mostly 5-flowered spikelets, the glumes 3″ long, very acute and

more nearly equal. Dry hillsides and valleys from the Trinity Mountains to the Havallah Range, Nevada, and near Salt Lake City, Utah; 4,300–5,000 feet altitude; May, June. (1,323.)

FESTUCA OVINA, L. With the awn half the length of the flower. Indigenous from Northern New England and Wisconsin to the Saskatchewan and Rocky Mountains, Bear Lake and Behring Strait; Greenland; Colorado. East Humboldt Mountains; 7–8,000 feet altitude; July, August. (1,324.)

Var. BREVIFOLIA. (*F. brevifolia*, Br. *Steud. Gram.* 313.) Tufted; culms low and slender, 4–8′ high; leaves setaceous and sheaths glabrous, the uppermost leaves often very short and the sheath rather loose; panicle racemose and nearly simple, erect, 1–2′ long; spikelets 1–4-flowered; flowers terete, somewhat scabrous, about 2″ long, twice the length of the awn.—Referred to *F. ovina*, by Munro. Arctic Coast and Rocky Mountains. 373 Parry, 666 Hall & Harbour, and 620 Vasey are very nearly the same.—On the highest peak of the Clover Mountains, Nevada; 11,000 feet altitude; September. (1,325.)

FESTUCA ———? Culms tufted from a biennial or perennial fibrous root, 10′ high; nearly glabrous; sheaths exceeding the internodes; leaves revolute, linear-setaceous, 1–3′ long; panicle open, the branches 3–5 together, naked at base, puberulent, bearing 1–3 purplish, 3–4-flowered spikelets; glumes acute, the upper 1½″ long, nearly twice exceeding the lower, obscurely 5-nerved; flowers 1½″ long, cylindrical; palets nearly equal, acutish, the lower 5-nerved, the upper slightly bifid.—Collected by Stretch (144) in Western Nevada; in Herb. Torrey.

BROMUS BREVIARISTATUS, Thurb. (?) (*Certatochloa*, Hook. *Fl. Bor. Amer.* 2. 253, *t.* 234.) "Panicle elongated, loose, somewhat nodding or erect; spikelets lanceolate, compressed and sharply 2-edged, minutely scabrous; glumes moderately unequal, acute but not awned, nerved; lower palet acutely keeled, many-nerved, short-awned; leaves broadly linear, a little hairy, the sheaths villose-tomentose; culms 2–3″ high."—Differing from Douglas' plant chiefly in the character and amount of pubescence, the sheaths being simply hairy but not tomentose, (or very frequently wholly naked,) and the spikelets silky-pubescent, but less so than in *B. Kalmii.* Panicle 3–8′ long, slightly compound; spikelets about 1′ in length, 6–8-flowered; glumes 4–5″ long, the lower about 3-nerved, the upper 7-nerved, (about 5 and 9-nerved according to Hooker;) lower palet 5–8″ long, with an awn of 1–2″; leaves mostly

narrow; the broadest 2–3″ wide. Common in the mountains of Nevada, at 5–7,000 feet altitude, and probably extending from Washington Territory to New Mexico. (1,326.) The more glabrate and rather more frequent form is distributed separately. (1,327.)

Bromus ciliatus, L. From Florida to California and northward to the Arctic Ocean. East Humboldt Mountains; 6,000 feet altitude. (1,328.)

Phragmites communis, Trin. From Florida to Canada and westward to the Pacific. On the banks of fresh water streams and springs from the Truckee to the East Humboldt Mountains, Nevada; 4–6,000 feet altitude. Sugar is said by Durand & Hilgard to be extracted from the stalks of this grass by the Indians, but the scanty juice is not at all saccharine. A sweet secretion, however, is sometimes formed upon it in considerable quantity by aphides, as well as upon the leaves of cottonwood and other trees, and is collected by both the Utes and Mormons. (1,329.)

Triticum repens, L. From the Northern States and the Upper Missouri to the Arctic Ocean and Behring Strait, and from the Indian Territory and Northern Texas to Colorado, Utah, and California. Frequent and sometimes abundant in the valleys and mountains; well known as "Blue-joint," and valuable for hay and grazing; 5–9,000 feet altitude. Either awnless or nearly so. (1,330.)

Triticum caninum, L. Leaves linear-lanceolate, flat; spikelets much longer than the joints of the rachis; glumes acuminate or awned. From New England and the Northern Border States to the Saskatchewan; Dakota; Colorado; California. West Humboldt Mountains, Nevada. (1,331.)

Triticum strigosum, Steud. *Gram.* 347. (*Bromus*, Bieb. *T. ægilopoides*, Turcz.) Resembling the last, but glaucous, the leaves narrow and revolute; spike narrow-linear, with the spikelets shorter than the joints or but little exceeding them; glumes obtuse or acutish or sometimes acuminate.—Colorado, (657 Hall & Harbour; 625 Vasey;) Washington Territory, (Douglas.) Frequent in the East Humboldt Mountains, Nevada, at 6,500–9,000 feet altitude; also near Black Rock at the south end of Salt Lake at 4,500 feet altitude, with the upper florets of the spikelets awnless; July–September. (1,332.)

Hordeum jubatum, L. On the sea-coast of the Northern States, and from the upper Great Lakes and the Saskatchewan to the Mackenzie River and Sitka, and south and westward to Northern Texas, Arizona, Cali-

fornia, and Oregon. A common grass in the valleys and on the foot-hills through Nevada and in Utah, but eaten by animals only when young; 4–6,000 feet altitude; July–September. (1,333.)

Hordeum pratense, Huds. Culm 1–3° high when growing in water or moist places, with the spike very narrow, 2–3′ long; lateral flowers sometimes short-awned, the longer awns sometimes 1′ in length.—Ohio to Missouri and southward to Louisiana and Northern Texas; California to Oregon; Sitka. Diamond and Ruby Valleys, Nevada, and in Salt Lake Valley and the Wahsatch; 4,300–6,000 feet altitude; May–July. (1,334.)

Hordeum Himalayense, Ritt., Var. Ægiceras, Steud. *Gram.* 352. In a barley field on Antelope Island in Salt Lake. (1,335.)

Elymus condensatus, Presl. *Steud. Gram.* 351. Culm stout; 3–8° high, roughish-puberulent and short-pubescent at the nodes or nearly glabrous; spike 3–15′ long, erect, exserted or sheathed at base, sometimes close-paniculate; spikelets 2–6 together, 3–10-flowered, puberulent or nearly glabrous, exceeding the internodes of the pubescent rachis; glumes setaceous-subulate from a very narrow base, 4–5″ long; flowers 4″ long, acute or short-awned, or barely acutish, the upper palet 2-toothed.—Quite variable in the character of the inflorescence, but a now acknowledged distinct species. California to Colorado. Frequent in the valleys and mountains of Nevada; 4–8,000 feet altitude; July–October. (1,336.)

Elymus Sitanion, Schult. (*Sitanion elymoides*, Raf. *Steud. Gram.* 351, and *Polyantherix Hystrix*, Nees. *Steud. Gram.* 356.) Culms 4′–2° high, tufted, and with the leaves and sheaths glabrous or somewhat pubescent or scabrous; spike erect, 1–3′ long, squarrose with its long recurved awns, jointed and fragile at maturity; spikelets in pairs, 2–5-flowered, smooth or puberulent; glumes entire or usually parted to the base and the segments unequally 2-cleft, the divisions long-awned, (1–3′;) flowers 3″ long, the awn of the lower palet equaling that of the glumes, with often a subsidiary awn or tooth on each side at the apex of the palet.—A very variable grass, the true position of which has long been questioned. Later specimens, and especially 637 Vasey, (in part,) in which the glumes are reduced to the normal pair at the base of each spikelet and the flowers otherwise wholly as in *Elymus*, make it certain that Schulte's name should be preferred. From Northern Minnesota to Texas and west to California. East and West Humboldt and Clover Mountains, Nevada; 8,500–11,000

feet altitude; August, September; a low form (4–10′ high) with usually broad leaves, often sheathing the base of the spike, as first described by Nuttall. (1,337.) Taller specimens, with narrow convolute leaves and short awns, were also collected on Carrington Island in Salt Lake; 4,300 feet altitude; June. (1,338.)

DANTHONIA CALIFORNICA, Bol. *Proc. Calif. Acad.* 2. 182. Glabrous or more or less villous-pubescent or scabrous; culms ½–3° high, from a perennial fibrous root, erect, slender, glabrous; sheaths bearded at the throat; ligule very short; leaves linear, 3–4′ long, 1–2″ broad; panicle simple or subcompound, the few (1–10) spikelets terminal upon the solitary filiform divergent scabrous or pubescent branchlets; spikelets 5–10-flowered, compressed; glumes 7–9″ long, purplish, smooth; joints of the rachis bearded; lower palet 3–5″ long, villous on the margin, the awns equaling the palet and twice the length of the awned teeth.—About San Francisco Bay, California. Wahsatch Mountains, above Parley's Park; 7,000 feet altitude; June. (1,339.) A low form was collected near the same locality, with but a single spikelet and the leaves somewhat villous. (1,340.)

AVENA FATUA, L. *Steud. Gram.* 230. Culm 2–3° high, erect, smooth; leaves broad, (2–6″,) scabrous, very rough on the margins; ligule short; panicle erect, the 2 3-flowered spikelets few or solitary and erect upon the filiform divergent branchlets; glumes 9–15″ long, 9–11-nerved; palets 6–8″ long, brownish and pilose with rufous hairs, the geniculate twisted awn 1–2′ in length.—Abundant throughout the valleys of California. In a cultivated meadow near Unionville, Nevada; doubtless adventive. (1,341.)

AVENA SATIVA, L., was also found growing on the shores of Soda Lake in Carson Desert, an estray from some emigrant's wagon. (1,342.)

TRISETUM SUBSPICATUM, Beauv. From Northern New England to Wisconsin and the Rocky Mountains, and northward to the Arctic Ocean, Behring Strait, and Greenland; Colorado; California. On the peaks of the East Humboldt and Clover Mountains, Nevada; 9,500–10,000 feet altitude; August, September. (1,343.)

AIRA CÆSPITOSA, L. From the Northern States to the Saskatchewan and the Rocky Mountains; Colorado and California; Sitka. On stream-banks in Ruby and Huntington Valleys, Nevada, and in the Wahsatch; 6,000 feet altitude; July–September. (1,344.)

AIRA DANTHONIOIDES, Trin. *Steud. Gram.* 221. Annual, glabrous;

culms very slender, 3′–3° high, geniculate at base; sheaths smooth, exceeding the internodes; ligules elongated; leaves short (½–4′) and very narrow or convolute-setaceous; panicle diffuse, the capillary branchlets 2–4 together and naked below; glumes 2-flowered, with the plumose rudiment of a third, 2–3″ long, exceeding the flowers; lower palet truncate and denticulate, 1–1½″ long, awned below the middle, the awn 2–4″ long, geniculate; grain free, flattish, not grooved.—California; Washington Territory; Western Texas. Meadows near Salt Lake City, Utah; 4,500 feet altitude; May, June. (1,345.)

HIEROCHLOA BOREALIS, R. & S. From the northern Border States to the Saskatchewan, the Rocky Mountains, and Behring Strait; Labrador; Colorado and California. Bear River Cañon of the Uintas; 8,500 feet altitude; August. Refused even by hungry mules. (1,346.)

PHALARIS ARUNDINACEA, L. From the Northern States to Hudson's Bay and Bear Lake and west to Oregon. The *P. arundinacea* of Parke's Report, collected on the Gila by Dr. Antisell, is rather the southern *P. intermedia*, Bosc., which extends westward from Texas and the Indian Territory to California. On stream-banks in the East Humboldt Mountains, Nevada, in Salt Lake Valley, and on the Provo River in the Wahsatch; 4,300–6,000 feet altitude; June–August. Known as "Crazy Grass" from its reputed injurious effect upon horses. (1,347.)

BECKMANNIA[1] ERUCÆFORMIS, Host. *Steud. Gram.* 15. Culms stout, 1–3½° high, erect from an ascending base, with the sheaths glabrous; ligules elongated; leaves linear, 4–8′ long and 2–6″ wide, flat, acute, scabrous; panicle 4–12′ long, erect, strict, secund, the short crowded branchlets densely flowered from the base, glabrous; spikelets sessile, imbricately arranged in two rows, nearly orbicular, 1¼″ in diameter, the upper rudimentary floret minute, stipitate.—From the Saskatchewan to Bear Lake, south to the Indian Territory and west to Northern California and Oregon. West Humboldt Mountains and Ruby and Thousand Spring Valleys, Nevada, and in Salt Lake Valley, the Wahsatch and Uintas; 4,300–7,500 feet altitude; June–September. (1,348.)

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[1] BECKMANNIA, HOST. Panicle racemose, contracted. Spikelets compressed, 2-flowered, the upper floret an abortive rudiment. Glumes 2, obovate, compressed-boatshaped, subcoriaceous, equal, a little shorter than the flower, pointless. Palets membranous, the lower ovate, concave, acutish, mucronate, 3-nerved, the upper 2-nerved, bifid. Stamens 3. Styles 2, with elongated plumose stigmas. Scales 2, bifid, glabrous. Grain free, glabrous.—A coarse perennial aquatic.

Panicum capillare, L. From Florida to New England and west to the Saskatchewan, Nebraska and New Mexico; California. Truckee, Unionville and Ruby Valleys, Nevada; 4–6,000 feet altitude, and in the Wahsatch at 9,000 feet altitude; July–October. (1,349.)

Panicum dichotomum, L. From Florida to New England and west to Wisconsin, Indian Territory, and Texas; California. Found only near hot springs in Ruby Valley, Nevada, with the last; 6,000 feet altitude; September. (1,350.)

Panicum Crus-galli, L. From Florida to Canada, and west of the Mississippi from Arkansas and Texas to California; Washington Territory. Truckee Meadows, Nevada, and Salt Lake and Jordan Valleys, Utah; 4–4,500 feet altitude. Short-awned or awnless. (1,351.)

Setaria viridis, Beauv. Truckee Meadows, Nevada. Probably introduced, but also reported from the Burro Mountains and elsewhere in New Mexico. (1,352.)

Cenchrus tribuloides, L. From Florida to New England and the Lakes, and west to Texas, New Mexico and Nebraska; Southern California. Seen only in Jordan Valley, Nevada.. (1,353.)

## EQUISETACEÆ.

BY PROF. DANIEL C. EATON.

Equisetum arvense, L. Asia, Europe, Greenland, and in North America from Mackenzie River and Kotzebue Sound to New Mexico and from Maine to California. Washoe Mountains, at 5,000 feet altitude, fruiting in May; Monitor Valley, Nevada; near Cottonwood Lake in the Wahsatch, at 9,000 feet altitude, fruiting in July. (1,354.)

Equisetum lævigatum, A. Braun. From Illinois to the Pacific and southward to New Mexico. In the West Humboldt and Shoshone Mountains, Nevada, and in the Wahsatch; 5–7,000 feet altitude. Abundant in some localities and freely eaten by animals. This species is with great difficulty to be distinguished from *E. hiemale*, but is paler, smoother, and with less conspicuous sheaths. (1,355.)

Equisetum robustum, A. Braun. Tropical Asia, and in North America from British Columbia to Mexico and eastward to Ohio. West Humboldt Mountains, Nevada; 5,000 feet altitude. (1,356.)

## FILICES.

BY PROF. DANIEL C. EATON.

POLYPODIUM VULGARE, L. Japan, Manchuria, and Turkey in Asia; all Europe; Northern Africa and the Cape; Madeira, Azores and Canaries. North America from the Atlantic to Alaska, Vancouver's Island and Oregon, and southward to the mountains of Alabama and Colorado, (694 Hall & Harbour; 688 Vasey, a dwarf alpine form;) the true form is yet to appear from California. From a rocky side-gorge of Cottonwood Cañon in the Wahsatch; 7,000 feet altitude; the specimens not unlike the usual smaller forms of the Atlantic States. (1,357.)

ADIANTUM PEDATUM, L. Japan, Manchuria and Northern India. North America from Canada to North Carolina, and westward to California, Oregon and Alaska. With the last; 6–7,000 feet altitude. (1,358.)

ADIANTUM CAPILLUS-VENERIS, L. From Japan and China to Western Europe; Southern Africa; islands of the Atlantic, and the West Indies. In America from North Carolina to the Indian Territory and southward to Brazil and Juan Fernandez. Southern Utah, near St. George, (Dr. Palmer, 1870.)

PTERIS AQUILINA, L. Throughout the United States and nearly throughout the world. In the Washoe and East Humboldt Mountains, Nevada, and in Provo Cañon in the Wahsatch; 6,000 feet altitude. (1,359.)

CHEILANTHES LANUGINOSA, Nutt. From Illinois to the Rocky Mountains of British America, and southward to New Mexico and Arizona. California is given as its western range by Hooker & Baker, but probably incorrectly. On conglomerate and on limestone in the Wahsatch; 5–6,000 feet altitude. (1,360.)

PELLÆA BREWERI, D. C. Eaton. *Proc. Amer. Acad.* 6. 555. Rootstock ascending, short, covered, like the bases of the shining brown very fragile stalks, with abundant narrow crisped fulvous chaffy scales; fronds 2–6′ high, pinnate, the pinnæ short-stalked, membranaceous, mostly 2-parted, the upper segment larger; segments and upper pinnæ ovate or triangular-ovate, in the fertile fronds narrower and margined with a rather broad continuous involucre; veins evident, repeatedly forked.—Common on exposed rocks in the higher cañons of the Sierras of California, and eastward in the East Humboldt Mountains and in the Wahsatch; 7–9,000 feet altitude. The stalks are seem-

ingly many-jointed, and their persistent bases remain on the rootstock several years. PLATE XL. Fig. 17. Plant; natural size. Fig. 18. Sporangia, in position; magnified twelve diameters. Fig. 19. A sporangium; magnified forty diameters. Fig. 20. A sterile frond. (1,361.)

PELLÆA DENSA, Hook. *Sp. Fil.* 2. 150. (*Onychium densum*, Brackenr. *Bot. of Wilkes's Exp., Ferns, p.* 120, *t.* 13.) Rootstock short, scaly with blackish chaff; stalks clustered, polished, dark-brown, 4–10′ long, very slender and much longer than the ovate densely tripinnate frond; pinnules linear-oblong, acute, much crowded, 3–5″ long, membranaceous or somewhat coriaceous; sterile ones denticulate, fertile ones with the proper margin recurved and bordered with a narrow involucre.—Rogue's River and Fort Orford, Oregon, to the Yosemite. Rocky gorge above Cottonwood Cañon in the Wahsatch; 7,000 feet altitude. (1,362.)

CRYPTOGRAMME ACROSTICHOIDES, R. Brown. (*Allosorus acrostichoides*, Sprengel.) Arctic America and Alaska to California, and eastward to Lake Superior. In the Clover Mountains, Nevada, and in the Wahsatch and Uintas; 9–10,000 feet altitude. (1,363.)

ASPLENIUM FILIX-FŒMINA, Bernh. Throughout Europe and much of Asia and Africa. America from Alaska and Labrador to Venezuela. In the East Humboldt Mountains, Nevada; 6-7,000 feet altitude; a form with ample fronds of delicate texture, 2½–3½° high. (1,364.)

Var. MICHAUXII, Mettenius. *Fil. Hort. Lips., p.* 79. (*A. angustum*, Willd.) Fronds somewhat rigid and much narrower in outline, bipinnate; pinnæ narrowly lanceolate, usually diverging from the rachis at an acute angle or curved upward; pinnules serrated or slightly lobed; fruit-dots short; indusium straight or recurved.—Common from Maine to Lake Superior California, (Brewer.) Rocky side-gorge above Cottonwood Cañon in the Wahsatch; 7,000 feet altitude. (1,365.)

ASPIDIUM LONCHITIS, Swartz. Throughout Europe and in the Himalayas. Greenland and Arctic America to Canada and Lake Superior, and westward to Alaska and Oregon. Same locality with the last; 8–9,000 feet altitude. (1,366.)

CYSTOPTERIS FRAGILIS, Bernh. From Iceland to Tasmania, and from Japan westward to the Sandwich Islands. Greenland, Arctic America, Alaska and Labrador to Chili. In the Washoe, West Humboldt and East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6–9,000

feet altitude. A considerable variety of forms occurs in the collection, as in all collections. (1,367.)

Woodsia scopulina, D. C. Eaton. *Canadian Naturalist*, April, 1865, *p.* 90. Rootstock short, creeping; stalks 2–4′ high, chaffy at the base, stramineous, puberulent like the rachis and under surface of the frond with minute flattened hairs and stalked glands; fronds lanceolate, 4–8′ long, pinnate; pinnæ numerous, 8–10″ long, pinnatifid with 10–16 short ovate or oblong crenulate or toothed divisions; indusium very delicate, deeply cleft into laciniæ which terminate in short hairs composed of irregular cylindrical cells.—Oregon and California to Wyoming and Colorado; British Columbia, (Dr. Lyall.) In the East Humboldt and Clover Mountains, Nevada, on Antelope Island and in the Uintas; 7–9,000 feet altitude. (1,368.)

Woodsia Oregana, D. C. Eaton; *l. c.* From Lake Superior and Lake Winnipeg (Bourgeau) to Oregon, and the mountains of Colorado. In the East Humboldt Mountains, Nevada, on Antelope Island, and in Cottonwood Cañon in the Wahsatch, (D. C. Eaton;) 6–8,000 feet altitude. A smaller form than the last, and quite glabrous, but like it in having a continuous stalk and a very minute indusium. (1,369.)

## LYCOPODIACEÆ.

Selaginella rupestris, Spring. Throughout Northern Asia; East Indies; South Africa. America, from Alaska to Buenos Ayres, and eastward to the Atlantic. In the East Humboldt and Clover Mountains, Nevada, and in the Wahsatch; 8–9,000 feet altitude. All the specimens are of the stouter and short-stemmed form, called *borealis* by Spring. (1,370.)

Isoetes echinospora, Durieu, Var. Braunii, Engelm. "New England to Western New York, and northward." Alpine lake, Bear River Cañon in the Uintas; 9,500 feet altitude; August. (1,371.)

## HYDROPTERIDES.

Marsilia vestita, Hook. & Grev. Leaflets broadly wedge-shaped, unequal-sided, and like the petioles minutely appressed-hirsute; sporocarps mostly solitary in the axils, short-stalked, hairy.—Oregon to New Mexico and Texas. Goose Creek Valley, Nevada; 6,000 feet altitude; September. (1,372.)

## CHARACEÆ.[1]

Chara fragilis, Desv. With the next the widest distributed species of the genus. Ruby Valley, Nevada; 6,000 feet altitude; August. (1,373.)

Chara fœtida, A. Braun. (*C. vulgaris*, Auct., in part.) In all parts of the world, at higher altitudes and latitudes than any other species. Ruby Valley, Nevada, Pack's Cañon in the Uintas, and Provo Cañon in the Wahsatch; 6–7,000 feet altitude; July. (1,374.) A peculiar form was also collected at Diamond Springs, Nevada, at 5,500 feet altitude. (1,375.)

Nitella opaca, Agardh. Northern Europe. In Truckee Pass and Ruby Valley, Nevada, and in Cottonwood Cañon in the Wahsatch; 4–6,000 feet altitude; July–September. (1,376.)

## MUSCI.

DETERMINED BY THOMAS P. JAMES, ESQ.

Weisia crispula, Hedw. Alpine and subalpine Europe; Eastern Siberia, (Dall;) Fuegia Hermite Island, (Hooker;) Greenland, (Kane;) Davis Strait, (Taylor;) Rocky Mountains of British America, (Drummond;) Galton Mountains and Fort Colville, (Lyall;) Colorado, (Hall.) Found in the Wahsatch and Uintas, Utah, on the bark of dead pines and on rocks; 7,500–8,000 feet altitude. (1,377.)

Fissidens grandifrons, Brid. Southwestern Europe and Algeria; Niagara Falls; British Columbia, (Lyall;) Humboldt County, California. At a cold spring in Ruby Valley, Nevada; 6,000 feet altitude. (1,378.)

Pottia subsessilis, Schwg. Northwestern Europe; South America; Rocky Mountains of British America, (Drummond;) Illinois; Texas; Los Angeles, California. Under sage-brush near Carson City, Nevada; 4,500 feet altitude; March. (1,379.)

Pottia cavifolia, Ehrh. All Europe; Andes; Fort Colville, (Lyall.) On the side of a ditch near Carson City, Nevada; April. (1,380.)

Pottia truncata, Br. & Sch. All Europe; Africa; New England,

[1] Determined by Prof. A. Braun of Berlin. The *Characeæ* are little understood by botanists generally, and it is not thought advisable to endeavor to give either generic or specific characters in this place. *Nitella*, however, has always a stem composed of a single tube, and the fruiting rays are branched or forked, while *Chara* has usually a stem composed of several tubes covered with an epidermis, and the fruiting rays are simple. In *Nitella* the nutlets have a very faint coronula or none, and are few-striate, while in *Chara* the coronula is distinct and persistent, and the nutlets are many-striate.—D. C. E.

New York and Pennsylvania. Var. SUBCYLINDRICA, Br. & Sch. Sardinia. In a wet meadow near Carson City, Nevada; May. (1,381.)

POTTIA HEIMII, Hook. Nearly all Europe; Western South America to Cape Horn; Saskatchewan and Rocky Mountains of British America, (Drummond, Bourgeau;) Colorado, (Hall;) Mount Dana, California. On stream-banks in the West Humboldt Mountains, Nevada, and in the Wahsatch; 4,500–6,000 feet altitude. (1,382.)

ANACALYPTA LATIFOLIA, Nees & Hsch. This singular and elegant alpine plant may be readily recognized by its short stem and gemmiform clustered apex, julaceous obtuse leaves of a bright silvery hue, and glossy chestnut-brown capsule.—Alpine regions of Europe; Davis Strait, (Taylor;) Rocky Mountains of British America, (Drummond.) On rocks at the head of Bear River in the Uintas; 11,000 feet altitude; August. (1,383.)

DESMATODON LATIFOLIUS, Br. & Sch. Alpine and subalpine Europe; Greenland; Labrador; Rocky Mountains of British America, (Drummond;) Colorado, (Hall;) Cascade Mountains, Washington Territory, (Lyall;) Mount Dana, California. Var. MUTICUS, Br. & Sch. On wet shaded rocks and stream-banks in the East Humboldt Mountains, Nevada, and in the Wahsatch; 8–9,500 feet altitude. (1,384.)

DESMATODON FLAVICANS, Br. & Sch. Central Europe; Wisconsin; Rocky Mountains of British America, (Drummond.) Var. OBTUSIFOLIUS, Br. & Sch. On a dry overhanging rock, intermingled with *Brachythecium Utahense*, near Hanging Rock Station in Echo Cañon of the Wahsatch; 6,000 feet altitude; July. This rare variety has been heretofore only found by Drummond at Lake Winnipeg. (1,385.)

DESMATODON CERNUUS, Wahl. Northern and Central Europe; Rocky Mountains of British America, (Drummond.) Differing from Drummond's specimens in its longer operculum. On a stream-bank in Ruby Valley, Nevada; 6,000 feet altitude. (1,386.)

DIDYMODON RUBELLUS, Roth. Europe; Abyssinia; New York and Pennsylvania; Mount Dana, California. On stream-banks in the Havallah and East Humboldt ranges, Nevada, and on the bark of a dead pine in the Uintas; 5–8,000 feet altitude. (1,387.)

DIDYMODON CYLINDRICUS, Nees & Hsch. Great Britain and Central Europe; India; New Hampshire and Pennsylvania. In the West Humboldt Mountains, Nevada. (1,388.)

Barbula subulata, Dill. Alpine Europe; from Canada to the Rocky Mountains, (Drummond;) Big Tree Grove, California; on Bill Williams River, Arizona. On rocks in City Creek Cañon near Salt Lake City, Utah; 5,000 feet altitude. (1,389.)

Barbula lævipila, Br. & Sch. Temperate and Southern Europe; Northern Africa; Vancouver's Island, (Lyall;) Mount Diablo and Sacramento, California. In the Pah-Ute Mountains, Nevada; 5,000 feet altitude. (1,390.)

Barbula brevipes, Lesqx. On Russian River and at Mission Dolores, California. Near Carson City and on granite rocks in the Trinity Mountains, Nevada; 5,000 feet altitude. (1,391.)

Barbula ruralis, Dill. All Europe; Arctic British America and Rocky Mountains; Massachusetts and Pennsylvania; Texas; Cascade Mountains and Fort Colville, (Lyall;) Sierras of California. On sandy soil in shaded places near Carson City, and on rocks in the West Humboldt Mountains, Nevada, and in the Wahsatch; 5,000 feet altitude. (1,392.)

Barbula Muelleri, Bruch. Scotland and Southern Europe; Chili; Alaska; Vancouver's Island, (Lyall;) California. Near Carson City, Nevada; 5,000 feet altitude. (1,393.)

Ceratodon purpureus, Dill. In all quarters of the globe; "the most cosmopolitan of mosses." Everywhere east of the Mississippi; Davis Strait, (Taylor;) Lake Winnipeg; from Kotzebue Sound and Sitka to Vancouver's Island and the Cascade Mountains; common in California. On dry rocks in the Hot Spring Mountains, Nevada; 4,500 feet altitude. (1,394.)

Distichium capillaceum, Hedw. Mountains of Europe, Asia, Africa and South America; White Mountains, New Hampshire; from Kotzebue Sound, the Arctic Barrens of British America and Davis Strait, (Taylor,) to the Saskatchewan and northern shore of Lake Superior; Colorado, (Hall;) Cascade Mountains, (Lyall;) Yosemite Valley, California. On rocks in the East Humboldt Mountains, Nevada; 5,500–9,500 feet altitude. (1,395.)

Distichium inclinatum, Swartz. Alpine Europe; Davis Strait, (Taylor;) Newfoundland; White Mountains; north shore of Lake Superior; Saskatchewan, (Bourgeau;) Mount Dana, California. On rocks at the head of Bear River Cañon in the Uintas; 11,000 feet altitude. (1,396.)

Encalypta vulgaris, L. All Europe; Colorado, (Hall;) Fort Colville, (Lyall;) Mount Diablo, &c., California. On rocks or sometimes stream-

banks, near Carson City and in the Trinity and East and West Humboldt Mountains, Nevada, in the Wahsatch, and on Antelope and Stansbury Islands in Salt Lake; 4,300–8,000 feet altitude. (1,397.)

Var. OBTUSA. Br. & Sch. On rocks in the East Humboldt Mountains, Nevada; 7,000 feet altitude. (1,398.)

ENCALYPTA RHABDOCARPA, Schwæg. Alpine and subalpine Europe; Nulato, Alaska; Davis Strait, (Taylor;) British America, (Drummond;) Colorado, (Hall;) Cascade and Rocky Mountains, (Lyall.) On a rocky slope in the East Humboldt Mountains, Nevada; 7,000 feet altitude. (1,399.)

ORTHOTRICHUM STURMII, H. & H. Mountains of Europe; Sandwich Islands; White Mountains, New Hampshire; Texas and New Mexico; Yosemite Valley, California. On limestone rocks, West Humboldt Mountains, Nevada; 7,000 feet altitude. (1,400.)

ORTHOTRICHUM JAMESIANUM, Sull., Ms. Monoicum; pulvinulo laxiusculo inferne fusciscente, superne sicco cinereo, madido pallescente-viridi; caule 6–8 lineari subjulaceo-foliato; foliis oblongis lanceolato-oblongisve valde obtusis; margine anguste revolutis, altius papillosis, costa infra apicem desinente; capsula immersa pyriformi sicca octo-costata sub ore amplo constricta, peristomii simplicis dentibus 16 discretis basi transverse-, medio circulari-, apice longitudinali-vermiculatis; calyptra parcissime ramentosa.—Distinguished from *O. obtusifolium*, its nearest congener, by its simple peristome, leaves with revolute margins, and its monœcious inflorescence. On limestone rocks in the East Humboldt Mountains, Nevada; 7,000 feet altitude. (1,401.)

ORTHOTRICHUM WATSONI, James. Monoicum; pulvinulo laxo læte viridi inferne dilute ochraceo; caule subunciali parcius diviso; foliis mollioribus laxiusculis e basi erecta hyalina elongato-lanceolatis acutatis eximie arcuato-recurvis, costa carinatis, toto margine revolutis cellulis superioribus punctiformibus papillosis, papillis longiusculis bi-trifurcatis; capsula emergente subelliptica sicca prominenter costatis sub ore amplissimo constricta haploperistomata, dentibus lævibus geminatim arcte connatis apice crucigeris flavescenti-albidis 7–10 articulatis; calyptra satis ramentosa; operculo brevius rostrato.—A very distinct species, allied to *O. Texanum*, Sulliv., but its color is different, its leaves are broader, softer, and much more recurved, and the cells of the upper half of each leaf are covered with longer and more or less divided papillæ. The teeth of the peristome are yellowish-white, with a

tendency to separate as in *O. Texanum;* the cross-like projections from their apices are an unusual feature. On damp shaded rocks in the West Humboldt Mountains, Nevada; 5,500 feet altitude. (1,402.)

ORTHOTRICHUM ANOMALUM, Hedw. All Europe; Algeria; Greenland; from the Barrens of Arctic America (Richardson) to the Saskatchewan, (Bourgeau,) Lake Superior, and Canada; Massachusetts and Pennsylvania; Colorado, (Hall.) Var.; differing from the type in its thicker leaves, with more revolute margins and more prominent papillæ, which are often bifid, and in its closer areolation; calyptra more pilose. Better specimens may prove it a new species. On sand from granite rocks in Clear Creek Cañon near Carson City, Nevada; 5,000 feet altitude. (1,403.)

ORTHOTRICHUM LÆVIGATUM, Zetterstedt. Differt ab *O. anomalo* simili: foliis solidioribus ad marginem valde revolutis margineque ipso papillis prominulis crenulato, angustius retriculatis, reti basilari breviore sæpius sinuoso-lineali; flore masculo axillari; calyptra magis pilosa; capsula ovato-oblonga omnino estriata, leptoderma, lutescente, sicca cylindracea, sulcis angustis irregularibus exarata; peristomii dentibus lanceolatis, regularibus, densius articulatis, punctatis, siccitate reflexis.—This species is allied to *O. anomalum*, from which it may, however, be known by its smooth capsule with the teeth of the peristome reflexed when dry. It might be mistaken for *O. striatum*, L., (*O. leiocarpum*,) on account of its smooth capsule, the only point of resemblance. Norway; not before detected in America. In Willow Creek Cañon in the Pah-Ute Mountains, Nevada; 5,500 feet altitude. (1,404.)

ORTHOTRICHUM RUPESTRE, Schl. Mountains of Europe; Barrens of Arctic America, (Richardson;) Big Tree Grove and Yosemite Valley, California. On dry rocks in the East Humboldt Mountains, Nevada; 6,500 feet altitude. (1,405.)

ORTHOTRICHUM OCCIDENTALE, James. Most nearly allied to *O. strangulatum*, from which it differs chiefly in its longer and more loosely foliated stem, in its little longer acute and strongly papillose leaves, the papillæ more usually bifid and truncate, and in its slightly longer pedicel, &c.—On rocks in the Uinta Mountains, Provo Cañon, Utah; 8,000 feet altitude. (1,406.)

Var. With longer papillæ, shorter capsule, &c.—In Willow Creek Cañon above Washoe Lake, Nevada; 5,500 feet altitude. (1,407.)

GRIMMIA (SCHISTIDIUM) CONFERTA, (Funk.) Mountains of Europe; Abyssinia; New England, Pennsylvania and Illinois; Mount Diablo, Califor-

nia. On shaded rocks in the West Humboldt Mountains, Nevada, and in Bear River Cañon of the Uintas; 7–7,500 feet altitude. (1,408.)

GRIMMIA (SCHISTIDIUM) APOCARPA, (Br. & Sch.) Europe, Asia, Africa and South America; very common in the Eastern States; throughout Canada and British America to the Arctic Ocean; Yosemite Valley, California, and on the Colorado River in Arizona. A variety was collected on rocks in Bear River Cañon in the Uintas; 7,500 feet altitude. (1,409.)

GRIMMIA ANODON, Br. & Sch. An interesting species, distinguished by its small cushions of a dark-green aspect at the surface and yellowish-brown color below, the subglobose capsule entirely immersed by reason of its short curved fruitstalk, and the peristome wanting. Central and Western Europe; New Brunswick. On limestone rocks in Secret Valley, eastern base of the East Humboldt Mountains, Nevada; 6,000 feet altitude. (1,410.)

GRIMMIA PULVINATA, Dill. In nearly all quarters of the world, not arctic; Disco Island and Cumberland Sound, (Taylor;) Fort Colville, (Lyall;) Clear Lake and Russian River, California; Bill Williams Fork, Arizona. On dry rocks near hot springs in the Hot Spring Mountains, Nevada, at 4,500 feet altitude, and on rocks in Bear River Cañon, Uintas; 7–10,000 feet altitude. (1,411.)

GRIMMIA ORBICULARIS, Br. & Sch. This elegant species differs from *G. pulvinata* in the following respects: Leaves narrower, the marginal cellules at the base enlarged; pedicel pale-yellow; capsule smaller, roundish, from yellow passing to bright red in ripening, smooth and glossy while recent, obscurely ribbed when dry, the walls thinner and without the blackish border at the orifice; annulus much narrower; operculum very short, scarcely apiculate; teeth of the peristome paler red, shorter and broader, with more distinct transverse bars, trifid, occasionally quadrifid, and much cribose below; calyptra dimidiate, not mitriform, and fugaceous.—Temperate and Southern Europe; Algeria; Western Asia; not before collected in America. On rocks near Carson City, Nevada; 5,000 feet altitude. (1,412.)

GRIMMIA OVATA, Web. & Mohr. Europe; Asia; Sandwich Islands; New York; from Lake Superior to the Rocky Mountains, (Drummond,) and in the Barrens of Arctic America, (Richardson.) On dry rocks in the Truckee and West Humboldt Mountains, Nevada; 4,700–7,000 feet altitude. (1,413.)

GRIMMIA CALYPTRATA, Hook. Rocky Mountains of British America,

(Drummond;) Colorado, (Hall;) New Mexico, (Fendler, Wright.) In crevices of volcanic rocks near Carson City, Nevada; 5,000 feet altitude. (1,414.)

GRIMMIA LEUCOPHÆA, Grev. All Europe; Africa; Australia; Massachusetts and Southern Ohio; Fort Colville, (Lyall;) San Francisco. On limestone rocks in Secret Valley, East Humboldt Mountains, Nevada; 6,000 feet altitude. (1,415.)

GRIMMIA MONTANA, Br. & Sch. Western Europe; Mount Diablo and Mono Pass, California. In mountain cañons, Nevada. (1,416.)

TAYLORIA SPLACHNOIDES, Schl. Norway and subalpine regions of Europe; Rocky Mountains of British America, (Drummond.) At Unionville in the West Humboldt Mountains, Nevada; 5,000 feet altitude. (1,417.)

PHYSCOMITRIUM PYGMÆUM, James. Planta generis minima; a *P. pyriformi* distat exiguitate; foliis minus distincte serratis; capsula oblongo-pyriformi, cellulis marginalibus transverse oblongis in seriebus 5–7 (nec 12–15) dispositis instructa, basi parcius stomatifera; operculo longiore; pedicello toto sinistrorsum torto; etc.—The shape of the capsule, with its narrow adherent annulus, readily distinguishes this species from *P. hians*, Lindb. On the ground, mountain side above Parley's Park, in the Wahsatch; 6,500 feet altitude. (1,418.)

FUNARIA HIBERNICA, Hook. Ireland and Western Europe; Cajon Pass in the Sierras, California. On rocks, Antelope Island in Salt Lake, Utah; 4,500 feet altitude. (1,419.)

FUNARIA HYGROMETRICA, Hedw. In all quarters of the world, including Australia, New Zealand and the Sandwich Islands; very common in the eastern United States, and found from Iklagalik and Nulato, Alaska, and the wooded regions of British America to the Saskatchewan, California, and Northwestern Mexico. On stream-banks, in wet meadows and under sage-brush, in the mountains and valleys of Nevada and Utah; 4,300–7,000 feet altitude. (1,420.)

Var. CALVESCENS, Br. & Sch. Tropical regions. In a meadow near Carson City, Nevada; 4,500 feet altitude. (1,421.)

LEPTOBRYUM PYRIFORME, Dill. Europe, Asia, and in the Andes of South America; frequent in the Eastern States, and extending to the Saskatchewan and wooded regions of British America, (Richardson, Drummond, Bourgeau,) Davis Strait, (Taylor,) the Rocky Mountains and Alaska; Clear Lake, Mount Dana and the Sierras, California. On stream-banks in the West Humboldt,

Pah-Ute and East Humboldt Mountains and in Ruby Valley, Nevada, and in the Wahsatch; also on a ridge in Bear River Valley near Evanston, Utah; 5–7,000 feet altitude. (1,422.)

WEBERA CRUDA, Schreb. Europe; Terra del Fuego; Guatemala and Mexico; New Hampshire, New York and Pennsylvania; Lake Superior; subarctic British America and Alaska; Davis Strait, (Taylor;) Washington Territory, (Lyall;) Colorado, (Hall;) Clear Lake and Big Tree Grove, California. In the shade of pines and on wet rocks in the East Humboldt and Clover Mountains, Nevada, (the latter specimens remarkable for their slender form,) and in Provo River and Bear River Cañons in the Uintas; 8–10,000 feet altitude. (1,423.)

WEBERA NUTANS, Schreb. All Europe; Asia; South America; common east of the Mississippi; Arctic British America and on the Saskatchewan, and from Behring Strait to Washington Territory; Mount Dana, California. In Bear River Cañon in the Uintas; 8,000 feet altitude. (1,424.)

WEBERA ALBICANS, Wahl. All Europe; Australia; South America and the Antarctic Islands; Canada, and common in the Eastern United States; Galton Mountains, (Lyall;) San Francisco. On stream-banks in Secret Valley Cañon, Nevada, and in the Wahsatch; 6–7,000 feet altitude. (1,425.)

BRYUM PENDULUM, Hsch. Norway and alpine Europe; Pennsylvania, Northern Ohio, and Wisconsin; Rocky Mountains of British America; Disco Island, (Taylor.) At Unionville in the West Humboldt Mountains, Nevada; 5,000 feet altitude. (1,426.)

BRYUM INCLINATUM, Swtz. All Europe; Kotzebue Sound; Yosemite Valley. On stream-banks in Ruby Valley, and on rocks in the East Humboldt Mountains, Nevada; 6–7,000 feet altitude. (1,427.)

BRYUM INTERMEDIUM, Web. & Mohr. All Europe; Arctic British America; Massachusetts, New York, Pennsylvania, Ohio, and South Carolina; Sierras of California. In meadows, on creek-banks, on rocks, and in the shade of pines, near Carson City and in the Trinity, West Humboldt, Havallah and East Humboldt Ranges, Nevada; 4,500–9,500 feet altitude. (1,428.)

BRYUM BIMUM, Schreb. All Europe; South America; New Hampshire, Pennsylvania, Ohio, and at Niagara Falls; Cumberland Sound, (Taylor;) Saskatchewan and Rocky Mountains, (Bourgeau;) Washington Territory,

(Lyall.) On a stream-bank in the East Humboldt Mountains, Nevada; 8,000 feet altitude. (1,429.)

Bryum torquescens, Br. & Sch. Western and Southern Europe; Africa and the Canary Isles; Australia and New Zealand; South America; New York, Texas, and New Mexico, (Wright;) San Francisco. On a stream-bank in the East Humboldt Mountains, Nevada; 8,000 feet altitude. (1,430.)

Bryum pallescens, Schwg. Mountains of Europe; New York, Pennsylvania and Ohio; Davis Strait, (Taylor;) Cascade Mountains, (Lyall.) On wet rocks in Cottonwood Cañon in the Wahsatch; 6,000 feet altitude. (1,431.)

Bryum atropurpureum, Web. & Mohr. Non-alpine Europe; Africa; Mount Sinai; Pennsylvania, Virginia, Tennessee, Northern Alabama, and Florida. In the West Humboldt and East Humboldt Mountains, Nevada; 5–7,000 feet altitude. (1,432.)

Bryum cæspiticium, L. All Europe; Asia Minor; Africa; South America; Sandwich Islands; from Arctic British America to the Saskatchewan and frequent east of the Mississippi; Washington Territory, (Lyall;) Sierras, California. At Unionville in the West Humboldt Mountains, Nevada, on a hillside near Salt Lake City, and in Bear River Cañon in the Uintas; 5–8,500 feet altitude. (1,433.)

Bryum argenteum, L. All over the world; very common eastward; Rocky Mountains, (Bourgeau;) Iktagalik, Alaska; Davis Strait, (Taylor;) San Francisco; Arizona. Under sage-brush near Carson City, Nevada; 4,500 feet altitude. (1,434.)

Bryum capillare, Hedw. Nearly all the world; New Hampshire, New York and Pennsylvania; Sitka; Vancouver's Island and Galton Mountains, (Lyall;) common in California.—Var. City Creek Cañon in the Wahsatch, near Salt Lake City; 5,000 feet altitude. (1,435.)

Bryum Duvallii, Voit. Northern and Central Europe; Newfoundland; New England; Fort Colville, (Lyall;) Eureka, California. On wet banks in the Clover Mountains, Nevada; 10,000 feet altitude. (1436.)

Bryum turbinatum, Hedw. All Europe; Mount Sinai and the Himalaya Mountains; Niagara Falls and Minnesota; Rocky Mountains of British America, (Drummond;) Galton Mountains, (Lyall;) Big Tree Grove, California. On stream-banks in the East and West Humboldt Mountains, and in Thousand Spring Valley, Nevada, in the Wahsatch, and under pines in the Uintas; 5–9,000 feet altitude. (1,437.)

Var. LATIFOLIUM, Br. & Sch. Europe; Big Tree Grove, California. On a stream-bank near Salt Lake City, Utah; 4,500 feet altitude. (1,438.)

Var. ANGUSTIFOLIUM, Br. & Sch. On stream-banks in the Havallah and East Humboldt Mountains, Nevada; 5–8,000 feet altitude. (1,439.)

MNIUM AFFINE, Bland. Central Europe; Caucasus; Canada and frequent eastward; Sitka; Clear Lake, California. Stream-banks in the East Humboldt Mountains and Ruby Valley; 6–7,000 feet altitude. (1,440.)

MNIUM MEDIUM, Br. & Sch. Central Europe; New York and Pennsylvania; Saskatchewan and the Rocky Mountains, (Bourgeau;) Alaska; Washington Territory, (Lyall.) Cañon of the North Fork of Provo River, in the Wahsatch; 6,500 feet altitude. (1,441.)

AULACOMNION PALUSTRE, Dill. All Europe; Siberia; Davis Strait, (Taylor;) from Kotzebue Sound and the wooded regions of British America southward to the Cascade Mountains, (Lyall,) and the Saskatchewan, (Bourgeau,) and frequent eastward; Mendocino, California. At the roots of trees in Bear River Cañon in the Uintas; 8,500 feet altitude. (1,442.)

AULACOMNION ANDROGYNUM, Dill. Central Europe and Scandinavia; Tennessee; Fort Colville and Vancouver's Island, (Lyall;) California, common. On a creek-bank in the East Humboldt Mountains, Nevada; 8,000 feet altitude. (1,443.)

MEESIA ULIGINOSA, L. All Europe; New Hampshire, New York and Canada; Illinois to Minnesota; Arctic America, (Richardson;) Davis Strait, (Taylor;) Washington Territory, (Lyall;) Colorado, (Hall;) alpine swamps, California. On a wet grassy bank in the Clover Mountains, Nevada; 10,000 feet altitude. (1,444.)

PHILONOTIS FONTANA, L. All Europe; India; Straits of Magellan; common in the Eastern United States; Rocky Mountains of British America, (Drummond, Bourgeau;) Colorado, (Hall;) Fort Colville, (Lyall;) common in the Sierras. On a stream-bank in the Wahsatch, Cottonwood Cañon; 9,000 feet altitude. (1,445.)

PHILONOTIS CALCAREA, Br. & Sch. Central Europe; White Mountains, New Hampshire; North Carolina. On stream-banks in the East Humboldt Mountains, Nevada, and in Provo Cañon in the Uintas; 7,500–8,000 feet altitude. (1,446.)

Var. CONTORTA, James. With the last. (1,447.)

TIMMIA MEGAPOLITANA, Hedw. Northern and Central Europe; common in the Eastern States; Melville Island and Arctic America; on the Saskatchewan, (Bourgeau;) Galton Mountains and Vancouver's Island, (Lyall.) On stream-banks and rocks in the West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–8,000 feet altitude. (1,448.)

POLYTRICHUM PILIFERUM, L. All Europe; Asia; New Zealand; Cape Horn and the Falkland Islands; Greenland; Melville Islands, Cumberland Sound, and Rocky Mountains of British America; Alaska; Vancouver's Island, and mountains of California; Pennsylvania and New York. On a stream-bank in Bear River Cañon in the Uintas; 8,500 feet altitude. (1,449.)

POLYTRICHUM JUNIPERINUM, Dill. Over nearly the whole world; Greenland; Behring Strait; Alaska; Washington Territory, (Lyall,) and Oregon; on the Saskatchewan, (Bourgeau,) and in the Rocky Mountains, (Drummond;) common in the Eastern States and in California. In a shaded swamp and on the shore of an alpine lake in Bear River Cañon, Uintas; 8,500–10,000 feet altitude. (1,450.)

POLYTRICHADELPHUS LYALLII, Mitt. Cascade Mountains, (Lyall;) Colorado, (Hall;) Yosemite Valley, Mount Dana, and Clear Lake, California. On wet rocks in the Clover Mountains, Nevada; 10,000 feet altitude. (1,451.)

FONTINALIS ANTIPYRETICA, L. All Europe; New England to Pennsylvania; Fort Colville, (Lyall;) Coast Range and Silver Mountains, California. Var. GIGANTEA, Sull. In running water in Ruby Valley, Nevada, and in Bear River Valley, near Evanston, Utah; 6,000 feet altitude. (1,452.)

PSEUDOLESKEA CATENULATA, Schl. (?) Mountains of Europe. On rocks in Bear River Cañon, Uintas; 8,000 feet altitude. The specimens are nearly allied to this species, but the areolation of the leaf is larger and the leaf itself more pointed and of a lighter color. (1,453.)

EURYNCHIUM STRIGOSUM, Hoffm. Temperate and Southern Europe; Chili; common east of the Mississippi and from Canada to the Rocky Mountains; Nulato, Alaska; Fort Colville and Galton Mountains, (Lyall;) Big Tree Grove, California. On a rocky ridge in Bear River Cañon, Uintas; 9,000 feet altitude. (1,454.)

EURYNCHIUM DIVERSIFOLIUM, Schl. Norway; Newfoundland; Southern Ohio. On the bark of dead pines in the Uintas; 7,500 feet altitude. (1,455.)

BRACHYTHECIUM RUTABULUM, L. All Europe; Peru; very common

eastward. On wet rocks and roots, West Humboldt Mountains, Nevada; 6,000 feet altitude. (1,456.)

Brachythecium asperrimum, Mitt. British Columbia, (Lyall, Douglas.) On a stream bank in Secret Valley, East Humboldt Mountains, Nevada; 6,000 feet altitude. (1,457.)

Brachythecium rivulare, Br. & Sch. Central and Western Europe; Newfoundland and Canada; New England, Pennsylvania and Wisconsin; Rocky Mountains of British America; Kotzebue Sound. Stream-bank in Frémont's Pass, East Humboldt Mountains, Nevada; 6,500 feet altitude. (1,458.)

Brachythecium collinum, Schl. Central Europe; British America, (Drummond;) Cascade Mountains, (Lyall;) Yosemite Valley. On stream-banks and rocks in the East Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 5–9,000 feet altitude. (1,459.)

Brachythecium salebrosum, Hoffm. All Europe. Kotzebue Sound; Washington Territory, (Lyall;) Saskatchewan, (Bourgeau;) and common eastward. At a warm spring in Goose Creek Valley, Nevada; 5,500 feet altitude. (1,460.)

Brachythecium lætum, Br. & Sch. Common eastward; Yosemite Valley. On a shaded stream-bank in the Wahsatch; 8,000 feet altitude. (1,461.)

Brachythecium albicans, Neck. All temperate Europe; Rocky Mountains of British America, (Drummond, Bourgeau.) On rocks at head of Bear River, Uintas; 9,500 feet altitude. (1,462.)

Brachythecium Utahense, James. Synoicum; pusillum tenerum laxe cæspitulosum; caule repente semiunciali copiose radiculigero; ramis ramulisque brevibus laxiuscule foliatis; foliis erecto-patentibus oblongo-lanceolatis sensim tenui-acutatis arctius pellucide lineari-areolatis, cellulis angularibus quadratis griseo-granulosis, ad medium costatis, toto margine serratis; perichætialibus erectis ecostatis raptim acuminatis grossius serratis; capsula oblongo-ovali subsymmetrica annulata in pedicello 3–4-lineari lævi erecta; operculo breviter conico obtuso; peristomio generis.—Not unlike *B. collinum* and *B. Hillebrandi*, but somewhat smaller and more delicate than either, differing from the first in its elongate-lanceolate leaf and erect symmetrical capsule, from the second in its smooth pedicel, and from both in its synœcious inflorescence. On sandstone rocks overhanging a dry stream-bed, near Hanging Rock Station, Echo Cañon, Utah; 6,000 feet altitude. (1,463.)

Camptothecium Nevadense, Lesqx. Sierras of California. On sand in Clear Creek Cañon near Carson City, and on rocks in the West Humboldt Mountains, Nevada, and in the Wahsatch; 5,000 feet altitude. (1,464.)

Amblystegium serpens, Dill. All Europe; South America; Alaska; wooded regions of British America; common eastward and in California. On stream-banks in the East and West Humboldt Mountains, Nevada; 5–7,000 feet altitude. (1,465.)

Amblystegium compactum, C. Müll. British America, (Drummond;) Fort Colville, (Lyall;) Oregon and California. On stream-banks in the West Humboldt Mountains, Nevada; 7,000 feet altitude. (1,466.)

Amblystegium radicale, Beauv. Europe; South America; Galton and Cascade Mountains, (Lyall;) common east of the Mississippi. In the West Humboldt Mountains, Nevada. (1,467.)

Amblystegium orthocladon, Sull. Europe; Washington Territory, (Lyall;) Little Lake Valley, California; common east of the Mississippi. At a cold spring in Ruby Valley, and at a warm spring in Thousand Spring Valley, Nevada; 6,000 feet altitude. (1,468.)

Amblystegium riparium, L. All Europe; Cuba; Greenland; frequent eastward and in California. On stream-banks in Thousand Spring Valley, Nevada, and in Provo Cañon in the Wahsatch; 6–7,000 feet altitude. (1,469.)

Amblystegium noterophilum, Sull. Pennsylvania; California, (Bigelow.) In a beaver-pond in Pack's Cañon, Uintas; 7,000 feet altitude. (1,470.)

Limnobium palustre, L. All Europe; Vermont and Pennsylvania; British America, (Drummond.) In a rocky gorge of American Fork Cañon, in the Wahsatch; 9,000 feet altitude. (1,471.)

Limnobium ——— ? A new species, but the specimens barren. On Cave Creek in Ruby Valley, Nevada; 6,000 feet altitude. (1,472.)

Hypnum pallescens, Schp. Alpine and subalpine Europe; Canada and British America, (Drummond;) and common eastward. On the bark of dead pines in Pack's Cañon, Uintas; 7,500 feet altitude. (1,473.)

Hypnum imponens, Hedw. Central Europe; common east of the Mississippi. On rocks in Bear River Cañon, Uintas; 9,000 feet altitude. (1,474.)

Hypnum uncinatum, Hedw. All Europe; Asia; Greenland; Davis Strait, (Taylor;) Kotzebue Sound and Alaska; wooded regions of British America; Cascade Mountains, (Lyall;) Sierras of California, and common east of the Mississippi. In the Wahsatch; 8,000 feet altitude. (1,475.)

HYPNUM FLUITANS, L. All Europe; South America; Davis Strait, (Taylor;) wooded regions of British America; in swamps eastward. In water in Bear River Valley and Cañon, Uintas; 6,500–9,500 feet altitude. (1,476.)

HYPNUM ADUNCUM, Hedw. All Europe; South America; British America, (Drummond;) in swamps eastward, and frequent in California. In a stream in the Virginia Mountains, and in an alpine lake in the Clover Mountains, Nevada; 5–10,000 feet altitude. (1,477.)

Var. GIGANTEUM, Br. & Sch. New Hampshire; Minnesota. In water in Bear River Valley, near Evanston, Utah; 6,000 feet altitude. (1,478.)

HYPNUM FILICINUM, L. All Europe; Pennsylvania and Ohio; Saskatchewan region, (Drummond, Bourgeau;) Colorado, (Hall;) Washington Territory, (Lyall.) In a wet rocky gorge of American Fork Cañon in the Wahsatch; 9,000 feet altitude. (1,479.)

HYPNUM ———? A new species, apparently near *H. filicinum* and *H. fluviatile*, but the specimens without fruit. In a cold spring in Ruby Valley, Nevada; 6,000 feet altitude. (1,480.)

## HEPATICÆ.[1]

RICCIA GLAUCA, L. In the Wahsatch Mountains; 7,000 feet altitude; June. (1,481.)

RICCIA CRYSTALLINA, L. West Humboldt Mountains, Nevada; 5,000 feet altitude; September. (1,482.)

MARCHANTIA POLYMORPHA, L. Reported on the western coast from California to Kotzebue Sound. East and West Humboldt Mountains, and in the Wahsatch; 5–8,500 feet altitude; July–September. (1,483.)

FEGATELLA CONICA, Corda. Reported from California and Sitka. Clover Mountains, Nevada, and in the Wahsatch; 7,000 feet altitude; June, September. (1,484.)

FIMBRIARIA TENELLA, Nees. Reported from California and Alaska. Wahsatch, near Salt Lake City; 6,000 feet altitude; May. (1,485.)

RADULA COMPLANATA, Dumort. In the Uintas; 9,000 feet altitude; July. (1,486.)

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[1] Determined by C. C. FROST, Esq.

# LICHENES.

BY PROF. EDWARD TUCKERMAN.

EVERNIA VULPINA, (L.,) Ach. This lichen, so abundant in the Sierras of California, was found only in a single locality in the Virginia Mountains, Western Nevada, upon *Juniperus occidentalis.* (1,487.)

THELOSCHISTES PARIETINUS, Var. POLYCARPUS, Fr. On *Quercus* in the Wahsatch. (1,488.) Also Var. LYCHNEUS, Nyl. In the Wahsatch. (1,489.)

PARMELIA OLIVACEA, (L.,) Ach. On *Cercocarpus;* Wahsatch. (1,490.)

PARMELIA CONSPERSA, (Ehrh.,) Ach. In the Uintas. (1,491.)

PHYSCIA STELLARIS, (L.) On rocks upon Antelope Island, Salt Lake, with various *Lecanoræ* and other lichens. (1,492.)

PHYSCIA OBSCURA, (Ehrh.,) Nyl., Var. approaching *P. pulverulenta.* On trees in the Wahsatch. (1,493.)

PELTIGERA APHTHOSA, (L.,) Hoffm. In the Uintas. (1,494.)

PELTIGERA RUFESCENS, (Neck.,) Hoffm. In Nevada and Utah; on the earth; sometimes too near the next. (1,495.)

PELTIGERA CANINA, (L.,) Hoffm. In the Uintas. (1,496.)

PANNARIA HYPNORUM, (Vahl.,) Delis. Uintas; on the earth. (1,497.)

PLACODIUM FULGENS, (Sw.,) DC., Var. BRACTEATUM, Ach. Carrington Island, Salt Lake; on the earth. (1,498.)

PLACODIUM ELEGANS, (Link.,) DC. On rocks in Western Nevada, Antelope Island, and the Uintas. (1,499.)

PLACODIUM VITELLINUM, (Ehrh.,) Næg. & Hepp. On moss near Carson City, and on rocks in the Uintas. (1,500.)

PLACODIUM CERINUM, (Hedw.,) Næg. & Hepp., Var. BIATORINUM, Nyl. On *Populus*, in the Wahsatch. (1,501.)

LECANORA RUBINA, (Vill.,) Schær. In the East Humboldt Mountains, Nevada, and in the Uintas. (1,502.) Also Var. OPACA, Ach. In Western Nevada, and on Antelope Island. (1,503.)

LECANORA MURALIS, (Schreb.,) Schær. (*L. saxicola*, Ach.) On rocks, Antelope Island. (1,504.) Also Var. GAROVAGLII, Anz. Near Carson City. (1,505.)

LECANORA SUBFUSCA, (L.,) Ach., Var. SYLVESTRIS, Nyl. (?) On Cottonwood, in the Wahsatch. (1,506.) Also Var. UMBRINA, Nyl. On rocks, Antelope Island. (1,507.)

LECANORA CINEREA, (L.,) Sommerf., Var. *a*. With the last, and in the Clover Mountains, Nevada. (1,508.) Also Var. CINEREO-RUFESCENS, Nyl. On rocks, Antelope Island. (1,509.)

LECANORA CERVINA, (Pers.,) Nyl., Var. With the last. (1,510.) Also in the same locality, Var. EUCARPA, Nyl. (1,511.)

LECANORA CHLOROPHANA, (Wahl.,) Ach. Same locality. (1,512.)

LECANORA XANTHOPHANA, Nyl. Utah. (1,513.)

RINODINA SOPHODES, (Ach., Nyl.) On Cottonwood, (with 1506,) in the Wahsatch. (1,514.)

CLADONIA PYXIDATA, (L.,) Fr. Uintas; on the earth in the shade of pines. (1,515.) Also Var. SYMPHICARPA, Fr. Same locality. (1,516.)

CLADONIA FIMBRIATA, (L.,) Fr., Var. *a*. Same locality. (1,517.)

BIATORA GLOBIFERA, (Ach.,) Fr. On the earth, near Carson City, Nevada. (1,518.)

BIATORA RUSSELLII, Tuck. Stansbury Island, Salt Lake. (1,519.)

BIATORA DECIPIENS, (Ehrh.,) Fr. On alkaline earth on Rabbit and Carrington Islands, Salt Lake. (1,520.)

LECIDEA VESICULARIS, (Hoffm.,) Ach. On the earth, near Salt Lake City. This well-known European species, the most interesting lichen of the collection, was found in Arctic America by Richardson, but the only evidence up to this time of its being an inhabitant of the United States was a specimen in the herbarium of Schweinitz, without indication of locality and not certainly known to be American. (1,521.)

BUELLIA MONTAGNÆI, (Kœrb.,) Tuck. Antelope Island. (1,522.)

BUELLIA GEOGRAPHICA, (L.,) Tuck. On rocks. (1,523.)

ENDOCARPON MINIATUM, (L.,) Schær., Var. On rocks, Antelope Island, and in the Uintas. (1,524.)

Var. COMPLICATUM, Schær. On rocks. (1,525.)

Var. MUHLENBERGII, Nyl. On rocks. (1,526.)

## FUNGI.[1]

AGARICUS ——— ? Some three or four species of this genus were collected, but none of them in a proper condition for determination. (1,527.)

CANTHARELLUS AURANTIACUS, Fries. Western Nevada. (1,528.)

[1] Determined in part by C. C. FROST, Esq., in part (the *Æcidia* and *Puccinia*) by Dr. J. S. BILLINGS, Ass't Surg. U. S. A.

LENZITES STRIATA, Swartz. In the Uintas. (1,529.)

DÆDALEA ——? In the Wahsatch. (1,530.)

HYDNUM ——? In the Uintas, upon a rocky ridge; 9,000 feet altitude. (1,531.)

MERULIUS LACHRYMANS, Schum. (1,532.)

CLAVARIA AUREA, Schæff. In the Uintas. (1,533.)

CLAVARIA FORMOSA, Pers. In the Uintas; rocky ridge; 9,000 feet altitude. (1,534.)

CLAVARIA FUMOSA, Pers. (?) In the Uintas; moist shaded cañon; 10,000 feet altitude. (1,535.)

LYCOPERDON GEMMATUM, Bull. Western Nevada. (1,536.)

LYCOPERDON GIGANTEUM, Batsch. City of Rocks, Southeastern Idaho, on sand; nearly 1° in diameter. (1,537.)

PEZIZA STERCOREA, Pers. On muddy stream-banks in the West Humboldt Mountains, Nevada. (1,538.)

ÆCIDIUM CRASSUM, Pers. On *Phlox;* Western Nevada. (1,539.)

ÆCIDIUM BAHAIÆ, B. & C. On *Arabis;* Western Nevada. (1,540.)

PUCCINIA RUGOSA, J. S. Billings. *Sp. Nov.* Maculis nullis vel obliteratis; cæspitulis hypophyllis elongatis irregularibus confertis sæpe confluentibus fuscis, epidermide lacerata cinctis; sporis late ovatis vix constrictis aculeatis vel rugosis rubro-fuscis; pedicellis brevissimis hyalinis. Long. ad .0015, lat. ad .0010 unc.—On leaves of *Macrorrhynchus troximoides.* Nevada. (1,541.)

PUCCINIA BRUNNEA, J. S. Billings. *Sp. Nov.* Maculis nullis; cæspitulis hypophyllis et caulinis rotundatis confertis fuscis; sporis medio constrictis luteis obovatis; pedicellis subæqualibus luteis longis. Long. ad .0016, lat. ad .0009 unc.—Nevada. (1,542.)

PUCCINIA GAYOPHYTI, J. S. Billings. *Sp. Nov.* Maculis nullis; cæspitulis epiphyllis et caulinis sparsis rotundis fuscis; sporis obovatis constrictis fuscis supra rotundatis; pedicellis brevissimis hyalinis. Long. ad .0013, lat. ad .0008 unc.—On *Gayophytum.* Nevada. (1,543.)

MYCELIUM ——? An abundant growth in some of the damp tunnels and drifts in the mines of Nevada, often hanging from the timbers in snow-white stalactite-like masses. Without fruit. (1,544.)

# ALGÆ.

BY PROF. H. C. WOODS.

ULVA MERISMOPEDIOIDES, Woods. *Sp. Nov.* Ampla membranacea late expansa dilute viridis tenuis radiatim et enormiter plicata, ambitu sæpe subrotundata; margine undulato, interdum subcrenato; cellulis enormiter ovalibus vel angularibus, nucleo destitutis, quarternariis et in familias *Merismopediarum* modo obscure associatis. Diam. cell. max. $\frac{5}{12,000}{'} = .00041'$, plerumque $\frac{2}{12,000} - \frac{3}{12,000}{'} = .00016' - .00025'$.—Found in a mountain stream in Diamond range, Nevada; 6,000 feet altitude. (1,545.)

LEMANEA CATENATA, Kütz. With the last. (1,546.)

BATRACHOSPERMUM VAGUM, Kütz (?) Vage ramosissimum, uni- vel tripollicare, fuscum vel ærugineum; internodiis inferioribus ramellis numerosis obsessis, superioribus nudis vel subnudis; ramulorum articulis extremis setis longissimis instructis. Diam. spor. glob. $\frac{15}{4,500}{'} = .00333'$.—This is referred doubtfully to *B. vagum* and is very probably a new species. Found growing on the border of a beaver pond in Pack's Cañon, Uintas; 7,000 feet altitude; July. (1,547.)

NOSTOC CRISTATUM, Bailey. In cold alpine streams and lakes, on rocks, in the Clover Mountains, Nevada, and in the Uintas; 9–10,000 feet altitude. Common in the Alleghany Mountains, and identical with *N. alpinum*, K., of Europe. *N. Dickæi*, Sutherland, found in the low countries of Central British America, appears to be the same as our form, though the only published descriptions of it are imperfect. (1,548.)

PROTOCOCCUS NIVALIS, Ag. Not rare on old snows in the alpine regions of the Sierras, and in the East Humboldt and Clover Mountains, Nevada, and in the Uintas, giving a pale-pink tinge to the drifts. July–September. (1,549.)

Several other forms of fresh-water *Algæ* were collected, but not in suitable condition for determination.

# ADDITIONS.

Dr. Edward Palmer's collections in Southern Utah during 1870, received while the preceding Catalogue was going through the press, have added several genera and species to the list of known plants of that Territory, as well as several new species to our Flora. Such as could not be incorporated in the Catalogue are here appended, with a few that had been omitted, and localities are added extending the range of some of the other species.

Page 13. Berberis Frémontii, Torr. *Bot. Mex. Bound.* 30. A shrub 5–15° high; leaflets 2–4 pairs, the lowest approximate to the base of the petiole, rigid and coriaceous, glaucous, ovate-lanceolate or broadly ovate, ½–2′ long, shortly cuneate at base, undulate and sinuate-dentate with 1–4 pairs of spinescent teeth; racemes few, 1–3, erect, loosely 5–9-flowered, about equaling the leaves, the pedicels alternate or opposite, 4–10″ long; petals 2–3″ long; filaments inappendiculate; berries ovate or nearly globular, "dark-blue."—The mature fruit seems to have been first collected by Dr. Palmer and is dry and bladdery, globose, 4–6″ in diameter, apparently greenish-yellow; seeds 8, about 2½″ long. Western Texas, New Mexico, and near St. Thomas in Southern Utah.

Page 19. Streptanthus cordatus, Nutt. Near St. George, Southern Utah, (Palmer.)

Page 35. Viola Nuttallii, Pursh, Var. venosa. Near St. George, Southern Utah, (Palmer.) This is perhaps a distinct species.

## Page 36. POLYGALACEÆ.

Krameria[1] parvifolia, Benth. *Gray, Plant. Wright.* 1. 41. Shrubby, 1–2° high, canescent with appressed pubescence, erect, very much

[1] KRAMERIA, L. Flowers subresupinate. Sepals 4–5, slightly unequal, the outermost a little larger, one of the inner sometimes very small. Petals 5; 3 averse from the outer sepal, long-clawed, the claws connate or rarely free, the subequal lamina spreading or the middle one folded; 2 much shorter, thick and rounded, sessile at the base of the stamineal tube. Stamens 4, connate at base or to the middle; anthers 2-celled, dehiscent by a slightly introrse oblique foramen. Ovary 1-celled or half-2-celled by the intruded placenta. Ovules 2, collateral, pendent from the top of the side which is opposite the outer sepal; style acutish or truncate. Fruit coriaceous, globose or slightly compressed, spiny or muricate, indehiscent, 1-seeded. Seed estrophiolate, exalbuminous; testa thin; radicle terete, included between the fleshy cotyledons.—Undershrubs or suffrutescent herbs, usually prostrate and silky-tomentose; leaves simple or 3-foliolate, narrow or small; racemes terminal; pedicels usually bibracteolate in the middle. Benth. & Hook.

branched; branches divaricate, somewhat spinescent; leaves linear, about 4″ long, sessile, often subfalcate, obtuse or the younger mucronate; peduncles mostly solitary, often twice bibracteolate; flower-bud gibbous, ¼′ long; sepals purple, moderately unequal, ovate and oblong; posterior petals equal in length, with united claws, the lateral lamina dilated, oblique, rhomboid-ovate, the middle one much larger, narrowly oblong; stamens distinct, adnate to the claws; fruit ovoid, acuminate, sometimes subcordate, canescently hairy and beset with slender barbed prickles.—Southern California to Southern Texas and New Mexico; Southern Nevada, (Frémont.)

Page 38. CERASTIUM ARVENSE, L., and STELLARIA CRASSIFOLIA, Ehrh. Labrador, (Rev. S. R. Butler.)

Page 40. ARENARIA FENDLERI, Gray. The typical form of this species was collected in Southern Utah by Dr. Palmer. His very fine specimens are 1° in height, with a decidedly woody base.

Page 41. ARENARIA VERNA, L. Labrador, (Butler.)

Page 48. SPHÆRALCEA INCANA, Torr. *Plant. Wright.* 1. 21. Hoary-velvety throughout with a minute closely appressed stellate pubescence; stems erect, woody at base; leaves ovate, sub-3-lobed, obtuse, obsoletely crenulate, sometimes subcordate; flowers small, axillary, crowded and racemose-panicled; cells 2–3-ovuled. Var. OBLONGIFOLIA, Gray. Tall and slender, 2–3° high, loosely branching; leaves lance-oblong, the lower cauline 2–3′ long, more broadly lanceolate and often hastately 3-lobed, the upper usually only crenate-toothed, sometimes all more or less lobed; carpels beaked.—The specimens resemble the original 1329 Wright, (thus doubtfully referred by Dr. Gray and noted as "inclined to run into *S. angustifolia*, Spach.,") and others collected by Newberry in Ives' expedition; 58 and 886 Wright, considered a variety of *S. angustifolia* are but slightly different, and *S. Fendleri*, Gray, is but another form. New Mexico and Arizona; Southern Utah, (Palmer.)

Page 49—before GERANIACEÆ,

## ZYGOPHYLLACEÆ.

LARREA[1] MEXICANA, Moric. 3–10° high, the branchlets short and very numerous; leaflets a single pair, connate at base, 2–4″ long, elliptic, oblong,

[1] **LARREA, CAV. Sepals 5, deciduous, imbricated. Petals 5, unguiculate, exceeding the calyx, deciduous, imbricated. Disk small, 10-lobed. Stamens 10, inserted at the base of the disk; filaments attached below upon the outer side to a bifid scale; anthers oblong. Ovary short-stipitate, pilose,**

or ovate, often curved or falcate, puberulent; flowers 9″ in diameter, the rounded sepals silky-pubescent; scale somewhat lacerate-toothed, a little shorter than the filaments.—The well-known "Kreasote plant," often abundant in Northern Mexico and the territories bordering upon it, from Southern California to Western Texas and the head-waters of the Arkansas River. Southern Nevada, (Frémont.)

FAGONIA[1] CALIFORNICA, Benth. *Bot. Sulph.* 10. ½–1° high or more, rough on the angles or glabrate, the branches diffuse, repeatedly dichotomous; stipules 0–2″ long, spinescent, spreading or reflexed; leaflets 3, ovate or oblong-lanceolate, 1–4″ long, articulated, naked on the margin, shorter than the petiole or about equaling it; sepals ovate-oblong, terminating in a spreading awn, minutely serrulate; petals 1½–2½″ long, pinkish or yellow; fruit 2″ long, exceeding the peduncle, scabrous.—Southern California and Arizona, and probably occurring in Southern Nevada.

Page 50, under RUTACEÆ. THAMNOSMA[2] MONTANUM, Torr. & Frém. Shrubby, 1–2° high, very much branched, the branchlets spinescent at the end; leaves scattered, rather thick, linear-spatulate, 4″ long; flowers dark-purple (?); disk much shorter that the (1–2″) stipe; fruit yellow, 3–4″ long.—Sonora, Southern California and Arizona; Southern Nevada, (Frémont;) Southern Utah, (Palmer.)

Page 51. CEANOTHUS GREGGII, Gray. *Plant. Wright.* 2. 28. Branchlets

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5-celled, attenuate into a subulate sometimes 5-partible style; stigmas 5, minute; ovules about 6 in each cell, pendent in pairs. Fruit globose, villous, 5-berried, the berries separating from the axis, indehiscent, 1-seeded. Seeds oblong; testa thin and smooth; albumen horny; cotyledons narrowly oblong.—Evergreen heavy-scented shrubs, coated with resin, the branches distichous, alternate, nodose; leaves opposite, 2-foliolate or pinnate, leaflets unequal, often connate; stipules persistent; peduncles interstipular, short, terminal, 1-flowered; flowers yellow. BENTH. & HOOK.

[1] FAGONIA, L. Sepals 5, deciduous, imbricated. Petals 5, unguiculate, caducous, imbricated. Disk short, inconspicuous. Stamens 10, inserted on the disk; filaments filiform, naked; anthers short-oblong. Ovary sessile, 5-angled, 5-celled, attenuate into a subulate 5-angled style; stigma simple; ovules 2, collateral, near the base of the cell, each pendent from an ascending funiculus. Fruit pyramidally 5-angled, 5-berried, the berries 1-seeded, at length free from the axis, dehiscent on the inner side, the fleshy endocarp separating. Seeds erect, compressed, broad-oblong; testa mucilaginous; albumen horny; cotyledons broad, flat, ovate.—Much-branched herbs, woody at base, diffuse or prostrate, rough with short hairs often tuberculated at top, or glabrous; leaves opposite, 1–3-foliolate, leaflets entire, mucronate; stipules often spinescent; peduncles solitary, interstipular, 1-flowered; flowers rose-color or violet, rarely becoming yellowish. BENTH. & HOOK.

[2] THAMNOSMA, TORR. & FREM. Calyx short, 4-lobed. Petals 4, sessile, entire, imbricate. Disk cup-shaped, crenate or lobed. Stamens 8, inserted at the base of the disk; filaments filiform, equal; anthers short. Ovary stipitate, didymous, 2-celled; cells dehiscent on the inner side, 4–6-seeded. Seeds subreniform, smooth or muricate; testa crustaceous; albumen fleshy; embryo terete, curved.—Small shrubs or suffrutescent herbs, subleafless or leafy, glandular and heavy-scented; leaves alternate, simple, entire, linear or cuneate; flowers yellow, pedicelled, toward the ends of the branchlets.—BENTH. & HOOK.

short, divaricate, rigid; leaves opposite, elliptical, 3–4″ long, very shortly petioled, subtomentose, with very rarely 1–2 small teeth toward the apex; flowers in small terminal umbels on very short (1–2″) lateral branchlets; fruit truncate-globose, with 3 prominences, the pedicel 3–4″ long.—Very near *C. cuneatus*, Nutt. New Mexico and Northern Mexico; Southern Utah, (Palmer.)

RHUS GLABRA, L. Southern Utah, (Palmer.)

Page 63. HOSACKIA PUBERULA, Benth. *Gray's Syn., l. c., p.* 349. Perennial, slender, erect, 6′–1° high, minutely appressed-puberulent; leaflets 3–6, on a short rachis, linear, lanceolate or oblong; peduncles exceeding the leaves, 1–4-flowered, the bract 1–3-foliolate; flowers 6″ long, turning purple; calyx-teeth attenuate, as long as the tube; pod linear, 1′ long, straight or nearly so.—Dr. Palmer's specimens have the peduncles 1–2′ long, but the petiole is wholly wanting, the apparently palmate leaflets oblanceolate, spatulate-oblong, or the lowest obovate. Other specimens from New Mexico, (Palmer, 1869,) and from the Rio Verde, Arizona, (Dr. Smart,) tend to unite *H. Wrightii* with this species. Southwestern Texas, Arizona, and Mexico; Southern Utah.

Page 64. DALEA LANATA, Spreng. (*D. lanuginosa*, Nutt.) Decumbent, canescently tomentose throughout, the stems 1–3° long from a biennial or perennial root; leaflets 4–6 pairs, obovate-cuneate, emarginate, 3–6″ long, 2–3″ wide; bracts ovate, abruptly long-acuminate; spikes usually opposite to the leaves, 2–3′ long, on moderately long peduncles, many-(30–50-) flowered; calyx-teeth plumose, subulate, broad at base, equaling the tube; petals deep-purple, wings and keel oval, nearly equal, the banner broadly cordate, a little the longer, 2–3″ long, but little exceeding or twice longer than the calyx; pod small.—From Nebraska, (James,) Arkansas and the Indian Territory to Western Texas, New Mexico, and Northern Mexico; Southern Utah, (Palmer.)

HEDYSARUM MACKENZII, Rich. Southern Utah, (Palmer.)

Page 78. LATHYRUS PALUSTRIS, L. Labrador, (Rev. S. R. Butler.)

Page 79. ROBINIA NEO-MEXICANA, Gray. A shrub 4–6° high; stipular spines often 3″ long, sharp and stout, subrecurved; leaflets elliptic or oblong, ½–1′ long; peduncles and the short-crowded racemes hispid with straight glanduliferous hairs; calyx finely hispid, the teeth subulate-lanceolate; flowers pink; pods glandular-hispid, similar to those of *R. viscosa.*—Arizona, New Mexico, and Southern Utah, (Palmer.)

PROSOPIS[1] PUBESCENS, Benth. (*Strombocarpa*, Gray. *Plant. Wright.* 1. 60.) A shrub 6–20° high; stipular spines in pairs, short and straight; pinnæ 2, with 4–10 pairs of coriaceous oblong leaflets, 3–4″ long, subpubescent beneath and on the petioles; peduncles axillary, shorter than the leaves; flowers in cylindrical spikes, 1–2′ long; calyx and petals yellowish appressed-silky externally; petals about 1″ long; stamens and style exsert; ovary short-stipitate; pod closely spiral, 1–2′ long, cinereous-pubescent when young.—The "screw-bean" of New Mexico and Arizona; Southern Nevada, (Frémont;) Southern Utah, (Palmer.)

PRUNUS MINUTIFLORA, Eng. *Plant. Lindh.* 185. A shrub 1–6° high, densely branched, subspinescent, glabrous with the young branchlets puberulent; leaves fascicled, small, 3–9″ long, oval or obovate (or oblong-spatulate,) attenuate to a short glandless petiole, very obtuse or acutish, entire or sparingly denticulate, more or less coriaceous, glabrous or somewhat puberulent when young; stipules very minute; flowers solitary, 1½″ long, subsessile, the calyx turbinate; stamens 10–15, in 2–3 rows; fruit globular, 4–6″ in diameter, more or less tomentose; the flesh thin and dry, narrowly grooved on the ventral suture, separating from the globose smooth and even stone, the sutures of which are but slightly ridged and grooved and the sides not at all compressed.—Very near *P. Andersonii.* Western Texas, New Mexico, and Southern Utah, (Palmer.)

Page 82. RUBUS STRIGOSUS, Mx. Labrador, (Rev. S. R. Butler.)

Page 83. CERCOCARPUS LEDIFOLIUS, Nutt. Southern Utah, (Palmer.)

Page 93. SAXIFRAGA CÆSPITOSA, L. Labrador, (Butler.)

Page 97. PARNASSIA PARVIFLORA, DC. Labrador, (Butler.)

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[1] PROSOPIS, L. Flowers 5-parted, usually sessile. Calyx campanulate, short-dentate. Petals connate below the middle or at length free, valvate. Stamens 10, free, shortly exsert; anthers tipped with a deciduous gland or rarely glandless. Ovary sessile or stipitate, many-ovuled; style filiform; stigma terminal, small. Pod linear, thick-compressed or subterete, straight, falcate, or variously twisted, coriaceous, indehiscent, the exocarp thin or coriaceous, mesocarp thick and spongy, hardly or rarely thin, endocarp cartilaginous or papyraceous, continuous with the septa between the seeds and sometimes enwrapping them; pod rarely subcontinuous within. Seeds usually ovate, compressed.—Trees or shrubs, prickly, unarmed, or having solitary or geminate axillary spines or spinescent stipules; leaves bipinnate, pinnæ usually 1–2 pairs, leaflets few–many pairs, often rather rigid; stipules and glands small or none; flowers small, in cylindrical spikes or rarely in globose heads, peduncles axillary. BENTH. & HOOK. Our North American species belong to the following sections, having the petals woolly at apex and the ovary villous:—

§ ALGAROBIA, Benth. Pod elongated, usually falcate, flat or subterete, continuous and moniliform or subjointed. Spiny trees or shrubs, with cylindrical, spikes.—P. GLANDULOSA, Torr.

§ STROMBOCARPA, Benth. Pod spirally twisted, with spongy mesocarp, endocarp sometimes thin. Shrubs with spinescent stipules, and globose, oblong or cylindrical spikes.—P. PUBESCENS, Benth., and P. CINERASCENS, H. & A.

Page 103. EPILOBIUM ALPINUM, L. Labrador, (Butler.)

Page 113. PETALONYX[1] THURBERI, Gray. *Plant. Thurb.* 319. *Bot. Mex. Bound., t.* 17. Perennial, woody at base, 1–2½° high, covered with a fine short retrorsely appressed rigid pubescence; cauline leaves 6–15″ long, ovate-lanceolate, smaller (2–6″) on the branches and usually ovate or triangular-ovate, entire or coarsely toothed toward the base; spikes ½–1′ long, dense, the bracts similar to the upper leaves, becoming somewhat scarious, each subtending 1–3 sessile flowers; bractlets small, linear; petals yellowish, fading, 2–3″ long, the claws sparingly hispid on the outside; filaments and style ½′ long, glabrous; ovary scarcely enlarging; capsule 1½–2″ long.—Colorado Desert, (Thurber;) Sonora, (Schott;) Southern Utah, (Palmer.)

MENTZELIA MULTIFLORA, Nutt. *Plant. Gambel.* 180. Branched, 3–18′ high; leaves oblong to linear-lanceolate, usually 1–2′ long, the lower sometimes 4–5′ long, pinnatifid with few–many lobes, sinuses deep or shallow; flowers yellow, fading to white, 4–9″ long; outer filaments dilated; capsules subturbinate or cylindrical, 3–10″ long, 2–3″ broad; seeds about 8 in each row, compressed, smooth.—Arizona to Western Texas and Colorado; Southern Utah, (Palmer.)

Page 117. ECHINOCACTUS POLYCEPHALUS, Eng. & Big. Southern Utah, (Palmer.)

Page 131. HERACLEUM LANATUM, Mx. Southern Utah, (Palmer.)

Page 132. GARRYA ——— ? Leaves elliptic-oblong, acute at each end, 1–2½′ long on 3–6″ petioles, densely pubescent beneath with straight appressed hairs, thinly pubescent or glabrate above, entire, with a revolute not muriculate margin; fertile aments 1′ long, pendulous, crowded; bracts broad-ovate, connate at base, foliaceous, acute or acuminate, 6–10 pairs; flowers solitary; fruit densely pubescent; sterile aments not seen.—A well-marked species, but not identified, though very near *G. laurifolia*, Benth., which, however, appears to have glabrous or nearly glabrous fruit and flow-

[1] PETALONYX, GRAY. Calyx-tube short-cylindric; lobes 4–5, linear, equaling the tube, deciduous. Petals 4–5, inserted on the margin of the epigynous disk, with very long claws, the blade ovate-spatulate. Stamens 4–5, with capillary filaments; anthers didymous. Staminodia none. Ovary 1-celled; style capillary; stigma simple; ovule solitary, pendent from the top of the cell. Fruit small oblong, fragile, irregularly bursting, hispid. Seed filling the cell; testa membranous, smooth; albumen none; cotyledons thick, fleshy; radicle very short.—An erect herb, branched above, cinereous-scaberulent, not bristly; leaves alternate, sessile, subentire; flowers small, in heads or terminal leafy spikes, bibracteolate. BENTH. & HOOK.

ers. It was collected by Bigelow and others in Northern Arizona and New Mexico and mentioned in *Bot. Whipple's Rep.* and *Bot. Mex. Bound.* under *G. elliptica*, from which it is clearly distinct. The species seen by Frémont in Southern Nevada was probably the same, so that it is doubtful if the true *G. elliptica* occurs in this region. Central Arizona, (Captain C. A. Curtis;) near St. George, Southern Utah, (Palmer.)

Page 136. PLECTRITIS CONGESTA, DC. Southern Utah, (Palmer.)

Page 163. APLOPAPPUS SPINULOSUS, DC., Var. CANESCENS, Gray.[1] *Pl. Fendl.* 75. California, New Mexico, and near Saltillo, Mexico. The typical *A. spinulosus* extends east of the mountains to the Saskatchewan. The plant is herbaceous, and has small pinnatifid or bipinnatifid rigid leaves, the lobes bristle-tipped. The pappus in the present specimens is very unequal, and the longer bristles are manifestly flattened toward the base.

TESSARIA[2] BOREALIS, T. & G. *Plant. Wright.* 1. 102. A branching willow-like shrub, several feet high; leaves an inch long or less, sessile, narrowly elliptical, acute at both ends, somewhat silky; heads not large, in terminal clusters of 3–8; outer involucral scales ovate, tomentose, the inner ones scarious and very narrow; flowers mostly very slender, pistillate only, a few (6–8) central ones larger and perfect.—New Mexico to California, usually on sand-banks along the rivers. This is the "Arrow-wood" of travellers, and the Indians are said to use the long straight branches for their arrows. There is a figure of it in Sitgreaves' Report.

Page 166. FRANSERIA DUMOSA, Gray. *Frémont's Report*, 316. A much branched shrub, 1–2° high, with small canescent pinnatifid leaves, the minute divisions 3–7, entire or lobed; heads in a loose spike, the sterile ones with a 5–7-cleft involucre; fertile involucre with straight lanceolate prickles.—California and Arizona.

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[1] The following determinations and notes upon the *Compositæ* of Dr. Palmer's Southern Utah collection are due to Prof. DANIEL C. EATON. In addition to these described species, Dr. Palmer also collected the following, which are new to that section of territory, but are already mentioned in the Catalogue.—*Erigeron Bellidiastrum*, Nutt. *E. pumilum*, Nutt. *E. concinnum*, T. & G., Var. *condensatum*, D. C. Eaton, and Var. *aphanactis*, Gray. *Chrysopsis villosa*, Nutt., Var. *hispida*, Gray. *Layia glandulosa*, H. & A. *Gnaphalium palustre*, Nutt. *Antennaria dimorpha*, T. & G. *Senecio Fendleri*, Gray. *Tetradymia spinosa*, H. & A. *Cirsium undulatum*, Spreng. *Stephanomeria pentachæta*, D. C. Eaton. *Crepis occidentalis*, Nutt. *Mulgedium pulchellum*, Nutt.

[2] TESSARIA, RUIZ & PAVON. Heads many-flowered, rayless, the outer flowers in several rows, pistillate, with truncate or 2–3-toothed slender corollas, 1–8 central flowers larger, perfect or staminate. Involucral scales imbricated in several rows, the inner scales longest, scarious and deciduous. Anthers tailed at the base. Style of the central flowers undivided, of the outer flowers 2-cleft, exserted, glabrous. Achenia short, somewhat terete, smooth. Pappus of rather few very slender capillary bristles.—Mostly South American shrubs, with scattered entire or toothed leaves.

Page 168. SIMSIA[1] CANESCENS, Gray. *Pl. Fendl.* 85. Stem leafy below or at the base only, the long branches nearly naked; leaves nearly sessile, obovate or somewhat rhomboid, nearly entire, scabrous-canescent on both sides; heads on long peduncles; involucre 4–6″ wide, of few herbaceous linear scales, densely covered with long white hairs; rays very large, wedge-obovate, obscurely 3-lobed at the apex, the tube long and slender; achenia oblong-wedge-shaped, villous with silvery-white hairs, especially along the edges, and bearing 2 linear-subulate villous awns nearly as long as the disk-corollas.—California and Arizona. Three other Helianthoid plants occur in Dr. Palmer's collection. One of them, having the achenia destitute of pappus, and with opposite linear revolutely margined leaves, is possibly a *Heliomeris.* Another, not in flower, is perhaps an *Encelia.* The lower leaves are opposite, petioled, oblong-lanceolate, 3-nerved, obscurely toothed, and scabrous-canescent on both sides. The third seems to be an undescribed *Tithonia.*

TITHONIA[2] ARGOPHYLLA. Silvery-white with a velvety pubescence; radical leaves 2–3′ long, 1′ broad, softly coriaceous, rhomboid-obovate, entire, 3-nerved, narrowed into a petiole nearly as long as the leaf, (stem-leaves not seen;) heads more than 1′ broad; involucral scales rigid, imbricated in many rows, at length reflexed; receptacle flattened-hemispherical; chaff with scarious margins, conduplicate and partly inclosing the compressed oblong-wedge-shaped silky-villous achenia; pappus of 2 short smooth rather stout awns, and an intermediate very short lacerate-fringed membrane.—Only a tuft of radical leaves and a single head have been examined. Dr. Palmer describes the stem as erect, 2–3° high, leafy, with the cauline leaves similar to the radical ones. The plant seems to be as near to *Viguiera* as to *Tithonia,* and indeed the information comes from Dr. Gray that the two genera are to be united by Mr. Bentham in his revision of the *Compositæ* for the *Genera Plantarum.*

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[1] SIMSIA, PERS. A genus very near to *Helianthus*, but with the involucre not imbricated, and the pappus consisting only of 2 rather stout awns, which, however, are wanting in one species of the genus.

[2] TITHONIA, DESF. Heads many-flowered, radiate; the rays ligulate, neutral; disk-flowers perfect, the corolla 5-cleft, the tube rather short, inflated above. Involucre imbricated; the scales ovate, rigid, with obtuse leafy appendages. Receptacle convex, the chaff lanceolate, membranaceous, and more or less embracing the achenium. Branches of the style with exserted hispid subulate appendages. Achenia of the ray triangular or obcompressed, pappus scanty, very short, of the disk compressed or subtetragonal, smooth or hairy, crowned with 1–2 awns from the stronger angles, at least in the central flowers, and bearing a single series of minute denticulate squamellæ, (which in the species above described are united into a ciliate crown.)—American herbs, with opposite or alternate triplinerved leaves and yellow flowers. (Character mostly from *De Candolle.*)

GAILLARDIA[1] PINNATIFIDA, Torr. *T. & G., Fl.* 2. 366.—Perennial, canescent; stem 8–15′ high, leafy and sparingly branched; leaves 1–3′ long, pinnatifid, the lobes few, oblong-linear, acute; heads 1–2′ broad; rays yellow, or "purple toward the base;" pappus-scales lanceolate, the barbellate awn not exceeding the purplish disk-flowers; fimbrillæ of the receptacle subulate, not dilated at the base.—Nebraska and Arkansas to New Mexico and Arizona; Chihuahua, Mexico. A showy flower; the rays in Dr. Palmer's specimens are pure yellow and have the tube very long and slender.

PALAFOXIA[2] LINEARIS, Lagasca. Suffruticose (?), cinereous-pubescent; leaves linear or lanceolate, obtuse, with two obscure submarginal nerves beside the midrib; peduncles and slender concave-carinate involucral scales beset with copious flesh-colored glands and rigid spreading white hairs; flowers 10–12, flesh-colored, all tubular, the lobes hairy at the tips; pappus of 4–8 unequal linear scales, the very strong midnerve slightly excurrent.—Plant a foot or more high; heads 8–10″ long. New Mexico to California and southward into Mexico. A form with much larger heads is noticed in *Pl. Fendl.*, *p.* 95, as occurring in California.

Page 172. CHÆNACTIS STEVIOIDES, H. & A. The specimens have a pappus of only four short obtuse scales.

Page 173. HYMENOPAPPUS LUTEUS, Nutt. Densely clothed with a fine white (sometimes deciduous) wool; stems about a foot high, "several from a thick caudex," corymbose at the top; leaves mostly radical, 1–2-pinnately divided into numerous narrow linear lobes 2–4″ long; heads rather large; involucral scales 8–12, oblong, scarious-margined, shorter than the disk;

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[1] GAILLARDIA, FOUGEROUX. Heads many-flowered, radiate; rays neutral, deciduous, many-nerved, the apex trifid; disk-flowers perfect, the tube short, the 5-cleft limb hispid with articulate usually colored hairs. Receptacle convex, usually fimbrillate. Involucral scales in 2–3 series, from a rigid base, running into a leafy appendage longer than the disk. Branches of the style terminated by a long awl-shaped hispid appendage. Achenia oblong or inversely pyramidal, villous. Pappus of 6–10 membranous or hyaline scales, the midnerve produced into a slender awn.—North American herbs, more or less pubescent or glandular. Leaves alternate, the lower ones petioled and often lobed, the upper sessile and entire. Heads on long naked peduncles. Rays yellow, often saffron-colored or brownish-purple at the base. Disk-flowers yellow or violet.

[2] PALAFOXIA, LAGASCA. Heads 10–many-flowered; rays deeply 3-cleft, pistillate, sometimes imperfectly developed or wanting; disk-flowers with a slender tube and a deeply 5-cleft expanded limb, the lobes smooth or hairy at the tip, spreading or recurved, very narrow. Involucral scales oblong or linear, herbaceous or membranaceous, at first appressed, at length stellately spreading, much shorter than the disk-flowers. Receptacle small, flat, naked. Branches of the style very long and slender, flattish, glandular-pubescent. Achenia linear, slender, 4-angled, pubescent or hispid, crowned by a pappus of 4–12 linear or oblong membranous scales, awnless, but with a strong midnerve, the outer achenia partly inclosed in the involucral scales, and often with a shorter pappus.—Herbs or suffrutescent, Texan and Mexican, branching, strigose or glandular-pubescent. Leaves mostly alternate, linear or lanceolate, 1–3-nerved, obtuse, entire. Flowers white, flesh-colored or purplish.

achenia densely villous; pappus-scales oblong, obtuse, erose-denticulate shorter than the tube of the yellow corolla.—From Ham's Fork in South-western Wyoming to New Mexico, Arizona and California.

Page 177. BAILEYA[1] PLENIRADIATA, Harv. & Gray. *Pl. Fendl.* 105. Floccose-woolly, about 1° high; stem and branches strict, leaves incisely pinnatifid or few-toothed, the radical ones bipinnatifid, and the uppermost simple and linear; involucre bell-shaped, the scales 20–30; rays 25–40, broadly obovate, twice as long as the involucre and at length reflexed and imbricated over it; disk-flowers 40–50; achenia obscurely 5-angled, 10-striate, minutely sprinkled with resinous atoms.—Heads an inch in diameter when fully expanded. A few of the central achenia persist long after the rest have fallen away. Dr. Gray observes, and these specimens confirm it, that in this species the branches of the style have minute conical appendages, though in the other two species they are absolutely truncate. From the Rio Grande to California, and southward to Sonora and Chihuahua, Mexico.

Page 209. VACCINIUM CÆSPITOSUM, Mx. Labrador, (Butler.)

Page 210. ARCTOSTAPHYLOS PUNGENS, HBK. (?) With specimens of *A. glauca*, collected by Dr. Palmer near St. George, are others which accord with what is considered *A. pungens*, HBK., differing from the first only in their smaller and narrower leaves, which are about 1′ in length and mostly acute at each end.

Page 211. KALMIA GLAUCA, Ait. Labrador, (Butler.)

Page 276. DATURA METELOIDES, DC. *Gray, in Bot. Mex. Bound.* 154. Pruinose-glaucescent, scarcely puberulent; leaves entire or often coarsely sinuate-toothed; flowers fragrant, white tinged with bluish-purple, often 8′ long, 5–6′ in diameter, strongly dilated above the cylindrical calyx, the limb conspicuously 5-toothed; the teeth very salient, narrowly subulate, ½–1′

[1] BAILEYA, HARVEY & GRAY; *l. c.* Heads radiate, 15–many-flowered; rays few–many, pistillate, in 1–3 rows, broadly-cuneate or oval, 3-lobed, 7-nerved, unguiculate but not tubular at the base, withering-persistent; disk-flowers with a short tube, the throat expanded, and the limb 5-toothed, the teeth ovate, glandular, erect. Involucre of appressed equal oblong-linear woolly scales. Receptacle flat, naked. Branches of the style of the disk-flowers truncate, penicillate, or with short conical appendages bearded at the base. Achenia oblong-clavate, somewhat prismatic, many-striate, the apex truncate. Pappus none.—Low herbs, probably biennial, natives of Northern Mexico and the neighboring parts of the United States, with alternate entire or pinnatifid leaves, and rather showy pale-yellow long-peduncled solitary heads. Four of the veins in the ray-corollas form three arched areoles, in each of which there is a free vein. The genus was named in honor of the late Prof. J. W. BAILEY, whose son, Mr. W. W. Bailey, was for a time botanist to the Survey of the 40th Parallel.

long; calyx 3–4′ long, the teeth 1′ long, unequal, acuminate; base of the calyx subcapsular, persistent, narrow; capsule nearly glabrous, globose, spinose, nodding.—Dr. Palmer's specimens occasionally show the folds of the sinuses also prolonged into short slender teeth. Southern California, (Xantus,) Northern Mexico, New Mexico, and Southern Utah.

## Page 319. SAURURACEÆ.

ANEMOPSIS[1] CALIFORNICA, Hook. *DC. Prodr.* 16. 1. 237. Stem simple, erect, 3–15′ high, puberulent or somewhat pilose, with a single broad clasping leaf in the middle, and an axillary branchlet reduced to 1 or more slenderly petioled leaves; radical leaves oblong-oval, cordate at base, 2–6′ long, 1–3′ wide, about equaling or exceeding the petioles, glabrous, subglaucescent beneath, stomatiferous on both sides, the younger ciliolate at base; petioles sparingly pubescent, dilated at base and sheathing; involucral leaves 6–15″ long, white becoming brown, unequal, oblong; spadix 6–12″ long, (sometimes 20″ in fruit;) bracts 2–3″ long, white, unguiculate with an orbicular lamina; filament equaling the anther.—From the Sacramento to Southern California and Mexico and eastward to the valley of the Rio Grande; near St. George, Utah, in alkaline soil, (Palmer.)

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[1] ANEMOPSIS, HOOK. (*Anemia*, Nuttall.) Flowers perfect, crowded in a simple conical spadix, which is surrounded by a 5–8-leaved persistent colored involucre, each flower subtended by a free colored bract. Stamens 6–8, free, epigynous; filaments very short; anthers oval, 2-celled, the cells lateral, adnate to a thick connective. Ovary solitary, deeply immersed in the rachis and united with it, 1-celled, with 3–4 parietal placentæ alternate with the stigmas. Stigmas 3, or sometimes 4, spreading; ovules 6-8 on each placenta, horizontal, in 2 rows, orthotropous. Capsule dehiscent by 3–4-valves at the top, about 6-seeded; seeds somewhat rounded, punctulate.—A perennial aquatic stoloniferous herb, with a thick pungently flavored root; leaves mostly radical, subcoriaceous, entire, pellucid-punctulate, pinnately nerved, petioled.

# APPENDIX.

## SYNOPSES OF GENERA.

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## STREPTANTHUS.

The synopsis of this genus given by Dr. GRAY in *Proc. Amer. Acad.*, Vol. VI., pp. 182–188, (1863,) is retained, with the necessary changes indicated in the note upon *Streptanthus* on page 19. A single more recent species is added.

§ 1. EUSTREPTANTHUS, Endl. Petals with a broad and ample plane lamina; sepals suberect or erect; flowers rather large, rose-purple; cauline leaves all sessile and cordate-clasping, glabrous and more or less glaucous.

* Flowers all subtended by persistent bracts.

1. S. BRACTEATUS, Gray. Silique elongated-linear, 6′ long, spreading; mature seeds not known.—Texas.

* * Flowers (or all but the lowest) ebracteate.

2. S. PLATYCARPUS, Gray. Siliques oblong-linear, 2½–3″ wide, very flat, erect; leaves clasping by rather short and rounded lobes, the lower and radical ones lyrate-pinnatifid.—S. W. Texas.

3. S. MACULATUS, Nutt. Siliques narrowly linear, 3–4′ long and 1″ wide, erect or ascending; cauline leaves clasping by long and obtuse lobes, the sinus very deep and nearly closed.—Arkansas and E. Texas.

§ 2. EUCLISIA, Nutt. Petals undulate-crisped, the lamina narrow or attenuated, scarcely if at all broader than the claw; sepals connivent, mostly colored, often saccate at base; the longer stamens often connate.

* Wholly glabrous and mostly glaucous.

(*a.*) Cauline leaves clasping by a cordate or sagittate base.

4. S. CARINATUS, Wright. Flowers purple, ½′ long, the urceolate calyx carinately 5-saccate; pedicels of the flowers and of the broadly linear and flat (half-grown) siliques erect; radical and lower cauline leaves runcinate-pinnatifid, the upper ones sagittate-clasping, all very glaucous; seeds unknown.—S. W. Texas.

5. S. CORDATUS, Nutt. Leaves thick, obtuse, toothed only at the apex. See page 19.

6. S. TORTUOSUS, Kell. Stem paniculately branched, or simple, 1–2° high; leaves entire or denticulate, the cauline suborbicular, cordate-clasping with a closed sinus; flowers purple or yellowish, 6″ long, in a lax raceme, the spreading or ascending pedicels 2–3″ long, the lowest often leafy-bracted; buds and sepals usually long-acuminate; silique narrowly linear, 2–3′ long, 1″ wide, falcately recurved-spreading, short-stipitate; seeds "winged" or wingless.—California.

7. S. BREWERI, Gray. Annual, 9′–2° high, branched from near the base, glabrous and glaucous; cauline leaves, except the lowest, strongly cordate-clasping with a closed sinus, entire or denticulate, the uppermost sagittate; flowers purple, on very short ascending pedicels, the lowest often leafy-bracted; buds 3″ long, obtuse or acutish, the sepals with scarious recurved blunt tips, sometimes downy; silique narrowly linear, 1½–2½′ long, less than 1″ wide, ascending or erect, straight or slightly incurved, compressed but torulose; seeds wholly marginless.—California.

(*b.*) Cauline leaves not cordate nor auriculate at base, entire or very obscurely toothed; sepals not dissimilar.

8. S. HYACINTHOIDES, Hook. Leaves linear-lanceolate and oblong-linear; flowers in a virgate raceme, spreading and soon pendulous, green and violet-purple; calyx cylindraceous; siliques erect-spreading, 2–4′ long, 1″ wide; seed narrowly margined.—E. Texas and S. W. Arkansas.

(*c.*) Leaves filiform, entire, some of them sagittate with a subclasping base; two outer sepals broadly dilated.

9. S. POLYGALOIDES, Gray. *Proc. Amer. Acad.* 6. 519. Annual ?, paniculately branched; racemes spikelike; calyx yellow, about equaling the purplish petals, 2–3″ long, the outer sepals subcordate-rounded, the inner oblong-lanceolate, acuminate; siliques very narrowly linear, 1–1½′ long, ⅔″ wide, straight or nearly so, reflexed, pointed with the short style; seeds narrowly margined.—California. "Rather to be distinguished as of a separate section."

* * More or less bristly or hirsute with simple hairs.

(*a.*) Cauline leaves or some of them usually auriculate- or sagittate-clasping and laciniate-toothed; flowers, at least the calyx, crimson-purple or red.

10. S. GLANDULOSUS, Hook. Cauline leaves narrowly lanceolate and mostly sagittate-clasping, their sparse teeth with callous rather than with glandular tips; racemes lax, the pedicels and flowers glabrous or nearly so; calyx ovate; siliques narrowly linear, 2–3′ long and less than 1″ wide, straight or curved, ascending; immature seeds slightly margined.—California.

11. S. HETEROPHYLLUS, Nutt. Annual or biennial, 3–5° high, branching, glabrous at top; leaves laciniate-pinnatifid, cauline ones sagittate at the base and clasping; flowers pendulous, purple; sepals deep-purple, glabrous, long, connivent; petals linear, undulated, purple and whitish; siliques very long (3–5′) and narrow, pendulous on pedicels 4″ long; stigma emarginate; seeds slightly margined.—St. Diego, California, (Nuttall.) The plants of Coulter and Xantus, referred here, are *Caulanthus Coulteri.*

12. S. HISPIDUS, Gray. Annual, 2–3′ high, hispid throughout; leaves cuneate or obovate-oblong, coarsely toothed or incised, the cauline sessile, hardly at all clasping; raceme short, loosely flowered; pedicels spreading or at length recurved; siliques linear, 1½′ long, 1″ wide, compressed, erect; stigma emarginate, nearly sessile; seeds winged.—California.

(*b.*) Cauline leaves not clasping nor auriculate at base, entire, the lower sinuate-pinnatifid with glandular teeth and contracted into a margined petiole; flowers yellow.

13. S. FLAVESCENS, Hook. Pilose; leaves linear-oblong; flowers erect; petals linear, acute; sepals ovate, obtuse, the petals nearly twice longer; anthers purplish, linear-oblong, filaments free; stigma capitate; siliques erect, hirsute, pointed with the short style. About 1° high, simple, erect; radical leaves nearly 2′ long, the cauline scarcely 1′ in length.—California. Prof. Brewer's plant, referred to this species, is *Caulanthus procerus.*

*Doubtful species.*

14. S. REPANDUS, Nutt. "Hirsute, particularly the lower part; leaves oblong-lanceolate, elongated, clasping, angularly toothed or repand above; flowers white; petals about as long as the calyx. Stem simple, about 2° high; pedicels shorter than the calyx; sepals and petals linear."—St. Barbara, California, (Nuttall.) Only known from Nuttall's description.

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## SILENEÆ.

In the distribution of the plants in the collection belonging to this tribe of the *Caryophyllaceæ*, the usual arrangement of the genera has been observed, as retained by Bentham & Hooker and as on the whole probably the most satisfactory. Dr. PAUL ROHRBACK in his Monograph of the Genus *Silene*, ("*Monographie der Gattung Silene;*" Leipzig, 1868,) and in his Synopsis of the *Lychnideæ*, (*Linnæa*, 36, pp. 170–270, 1869,) discusses at some length the relations and characters of the vexed genera of this subtribe. In his distribution, all of our native North American species fall into his genera *Melandryum*, *Silene* and *Viscaria*, which are distinguished chiefly by the capsule being in the first wholly 1-celled, in the second more or less 3–5-celled at base, (both having 3–5 pistils and the capsule dehiscent by twice as many teeth,) while *Viscaria* differs from *Silene* (as *Lychnis* from *Melandryum*) in having the number of teeth equal to that of the pistils. In his Synopsis, (page 203,) however, he confesses his dissatisfaction with the genus *Melandryum* as thus defined, admitting that the presence or absence of septa in the capsule is of little value in comparison with other characters, and that possibly it may not be constant even in the same species, and proposes a division, as perhaps the most natural, in which more weight is given to the number of pistils. Under such an arrangement he would limit *Lychnis* and *Viscaria* as before, referring to *Lychnis* and *Melandryum* only those 5-pistillate species in which the capsule dehisces at first septicidally, (which excludes all of our species,) making of the section *Gastrolychnis* a distinct genus of the same name, and transferring the section *Elisanthe* back to *Silene.*

His present synopsis, as including all our known species but the single new one of this collection, (*Lychnis nuda*, p. 37,) is here appended, though the arrangement will hardly be generally accepted.

## MELANDRYUM.

§ Gastrolychnis. Styles 5.

* Seeds with an inflated membranous margin.

1. M. involucratum, Ch. & Sch., Var. affine, Vahl. Greenland; Labrador.
2. M. apetalum, Fenzl. (*Lychnis*, L.) See page 36.

* * Seeds not margined.

3. M. triflorum, Liebm. (*Lychnis*, R. Br.) Greenland.
4. M. Ajanense, Rohr. (*Lychnis*, Regel.) See page 37.

§ Elisanthe. Styles 3.

* Fruiting calyx contracted at the apex.

5. M. Illinoense, Rohr. (*Silene regia*, Sims.) Ohio to Illinois and southward to Alabama and Mississippi.

* * Fruiting calyx open at the top.

(*a.*) Flowers in panicled cymes, the central ones reflexed in fruit.

6. M. Virginicum, A. Braun. (*Silene*, L.) From W. New York and Canada to Illinois and southward to Georgia and Alabama.

7. M. Pennsylvanicum, Rohr. (*Silene*, Mx.) From New England to Pennsylvania and Kentucky and southward to Georgia and Alabama.

8. M. Californicum, Rohr. (*Silene*, Dur. *S. laciniata*, Var., Gray.) Calyx-teeth ovate-oblong, obtuse; petals purple, many-cleft, the claws ciliolate; capsule ovate, 4–5-times longer than its stipe.—California.

(*b.*) Flowers all erect in fruit; calyx-teeth much shorter than the tube, and the capsule 3 or more times longer than its stipe, (except in *M. Wrightii.*)

9. M. Wrightii, Rohr. (*Silene*, Gray.) Calyx-teeth subulate, half as long as the tube; capsule oblong, about equaling its stipe; petals white, 4-cleft, the middle lobes 2–3-lobed or entire.—New Mexico; only collected by Wright.

10. M. Bolanderi, Rohr. (*Silene*, Gray.) Stems dwarf, erect, 1–5-flowered; calyx-teeth acute; petals pink, 4–6-parted, the broad claws villous-ciliate, long-exserted; capsule very shortly stipitate.—California; only collected by Bolander.

11. M. Hookeri, Rohr. (*Silene*, Nutt.) Stem low, subdecumbent, 3–7-flowered; calyx-teeth acute; petals white, divaricately 4-parted, the claws villous-ciliate (?), long-exserted.—Oregon; a single specimen, collected by Gardiner, (Gairdner ?)

12. M. Baldwinii, Rohr. (*Silene*, Nutt.) Stems low, suberect from a creeping base; calyx-teeth acute; petals white or pinkish, ovate-cuneate, fimbriately many-cleft, claws villous-ciliate.—Georgia; Florida.

13. M. laciniatum, Rohr. (*Silene*, Cav.) Roughish-pubescent; leaves lanceolate to linear; calyx-teeth lanceolate, acute, the striæ anastomosing above; petals scarlet, 4–6-cleft, claws glabrous and a little exserted; capsule oblong, 3 times longer than its stipe.—Northern Mexico and Southern California.

14. M. Greggii, Rohr. (*Silene*, Gray.) Leaves obovate or ovate-lanceolate, roughish-pubescent; branches and calyx densely viscid-pubescent; calyx-teeth oblong, white-margined, densely ciliate, the striæ above only uniting; petals scarlet, 4-parted, the claws glabrous, a little exserted.—New Mexico.

15. M. rotundifolium, Rohr. (*Silene*, Nutt.) Calyx pubescent with long hairs, the striæ anastomosing above, teeth oblong, obtuse.—Kentucky; Tennessee.

## SILENE.

Subgen. BEHEN. Corolla imbricate in æstivation; calyx almost always inflated, 10–20-nerved; the nerves reticulately veined or rarely only bifurcately united toward the top; perennial.

* Calyx 10-nerved, somewhat reticulate-veined above; petals 2-cleft, the claws naked.

1. S. Douglasii, Hook. See page 36.
2. S. nivea, DC. Pennsylvania to Illinois.

Subgen. SILENE. Æstivation of the petals alternately contorted; calyx 10-nerved and veinless or the nerves anastomosing, or 20–30–60-nerved and the nerves not anastomosing, rarely inflated in flower, sometimes so in fruit.

§ EUSILENE. Calyx 10-nerved, veinless or the nerves anastomosing.

* Inflorescence more or less compoundly divaricate, the branches equal or slightly unequal, (in a few foreign species one of the pair reduced to a simple pedicel,) or in some perennial species the stem 1-2-flowered. (*Dichasiosilene.*)

(*a.*) Perennial, dwarf, 1-flowered; calyx campanulate. (*Nanosilene.*)

3. S. ACAULIS, L. See page 36.

(*b.*) Perennial; inflorescence very compound; calyx obconic. (*Brachyanthæ.*)

4. S. MENZIESII, Hook. See page 36.

(*c.*) Annual; opposite branches equal or nearly so; calyx glabrous or rarely glandular-pubescent, in fruit contracted at top. (*Leiocalycinæ.*)

5. S. ANTIRRHINA, L. See page 36.

* * Perennial; inflorescence a simple or compound raceme, the branches short and few-flowered, or elongated and again racemose or cymose or verticillastrous. (*Botryosilene.*)

(*a.*) Flowers in simple racemes, the branches short, 1-flowered or the lower 3-7-flowered; pedicels bibracteolate at base; petals emarginate. (*Chloranthæ.*)

6. S. DRUMMONDII, Hook. See page 37, under *Lychnis*. As there stated no specimens are found in our herbariums other than with 4-5 pistils and 4-5 teeth to the capsule. Bourgeau's specimens from the Saskatchewan are similar. This species, under Dr. Rohrback's limitations, is strictly a *Viscaria*.

(*b.*) Flowers in simple or compound verticillastrous racemes; pedicels bibracteolate at base. (*Otiteæ.*)

7. S. BRIDGESI, Rohr. Roughish-pubescent, subviscid-glandular above; stem simple, erect; leaves long-lanceolate, acute; bracts and bractlets ovate, acute, densely ciliate; flowers in a simple verticillastrous raceme, the pedicels equaling the oblong dilating calyx; calyx-teeth long, obtuse, ciliate; petals white, long-linear, bifid with very narrow lobes, the claws ciliolate at base and with the filaments much exserted; capsule ovate-globose, 3-4 times exceeding the stipe; seed large, channeled on the back.—California.

(*c.*) Flowers in a subcompound raceme; claws and filaments woolly-ciliate. (*Lasiostemones.*)

8. S. INCOMPTA, Gray. (*S. Engelmanni*, Rohr.) Densely roughish-pubescent, glandular above; stems spreading, leafy; leaves oval-lanceolate or oblong, acute; pedicels shorter than the subnodding flower; calyx-teeth lanceolate, acute, ciliate, the tube cylindric, becoming ovoid; petals whitish, the limb small, linear-oblong, scarcely broader than the obtusely auricled claw, bifid, the segments emarginate or 2-lobed, the appendages subulate; capsule ovate, very short-stipitate.—California. Dr. Gray's name seems to be the older.

9. S. SCOULERI, Hook. Stem erect; leaves lanceolate or linear-lanceolate, acute; racemes narrow, few-flowered; flowers erect or nodding, longer or shorter than the pedicels; calyx oblong-clavate, somewhat dilating, the teeth broad-lanceolate, acutish, slightly ciliate; petals white or pinkish, bifid, the lobes oblong, emarginate, the appendages obtuse; auricles of the claw acute; capsule ovate-oblong, 3-4 times longer than the stipe.—Rocky Mts., from British America to New Mexico; Washington Territory.

(*d.*) Flowers in a loose compound raceme; claws and filaments glabrous. (*Nutantes* and *Italicæ.*)

10. S. STELLATA, Ait. From Canada to Georgia and west to Illinois and the Indian Territory.

11. S. OVATA, Pursh. Stout, 2-4° high; leaves in pairs, large; calyx tubular; petals gash-fimbriate.—Georgia and Carolina.

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## HOSACKIA.

Following Dr. GRAY'S Synopsis, *Proc. Acad. Phil.*, Dec. 1863, pp. 346-352.

§ 1. SYRMATIUM, Vogel. Legume small, 1-4-seeded, subulate or attenuate, often torose, incurved. Keel not attenuate upward, mostly obtuse; claws slightly exserted or included, that of the vexillum somewhat apart. Perennial herbs or somewhat shrubby, (*H. micrantha* annual,) with very short 3-7-foliolate leaves and black glandular stipules; flowers in sessile or short-peduncled umbels, small, yellow or whitish, often turning reddish.

* Mostly shrubby, with rigid slender branches, glabrous or silky puberulent becoming glabrate; leaflets 3, sometimes 5, small, thick, somewhat evergreen. Californian.

1. H. JUNCEA, Benth. Erect, broom-like; leaflets obovate, oval or oblong; umbels short-peduncled, few-flowered; calyx-teeth very short obtuse.

2. H. SCOPARIA, Nutt. Nearly glabrous, erect and 2–8° high, or sometimes decumbent, broom-like; leaflets linear-oblong or oblong; umbels sessile, usually crowded on the branchlets; calyx-teeth subulate, acute, the narrow tube 2–4 times longer.

3. H. CYTISOIDES, Benth. Subshrubby, decumbent or sarmentose, silky-puberulent or glabrate; leaflets obovate, oblong or linear-oblong, obtuse; umbels many-flowered, peduncled; calyx-teeth subulate-awned, recurved, about half as long as the tube.

* * More or less woody at base, diffusely decumbent, branches somewhat virgate, white with a silvery appressed silky pubescence.

4. H. SERICEA, Benth. Silky-canescent, much branched, ascending; leaves subsessile; leaflets mostly 3, oblong-linear or spatulate-oblong; calyx-teeth short or minute; flowers 3″ long, yellow, the incurved keel subacute. California.

5. H. ARGOPHYLLA, Gray. Densely tomentose; branches long, subsimple, decumbent; leaflets 3–5, obovate, 3–6″ long; umbels 8–12-flowered, capitate, short-peduncled, with a simple bract; calyx-teeth slender, the cylindrical tube about twice longer; flowers 4–5″ long, yellow; keel obtuse. See page 62.

* * * Herbaceous or nearly so, diffusely procumbent or prostrate, pubescent, tomentose, or glabrate; leaflets 3–5, sometimes 6 or 7, not thick nor silvery white, the petiole or rachis not abbreviated.

(*a.*) Calyx villous, teeth slender; silky or tomentose-pubescent; legume canescent, the fruiting part little exceeding the calyx.

6. H. TOMENTOSA, H. & A. Tomentose-villous with whitish or fulvous spreading hairs; leaflets obovate, 4–7″ long; umbels 6–12-flowered, capitate, short-peduncled, bract simple; calyx-teeth setaceous-subulate, as long as the turbinate-campanulate tube; flowers 3–4″ long; the keel very obtuse.—California.

7. H. DECUMBENS, Benth. Decumbent from a woody caudex; silky pubescence appressed; leaflets 4–5″ long, cuneate-obovate, rhombic-ovate or obovate-oblong, cinereous; umbels many-flowered, capitate, short-peduncled, bract 1–3-foliolate; calyx silky-downy, teeth subequaling the campanulate tube; flowers 5″ long, yellow, keel acutish.—Oregon and Washington Territory.

8. H. HEERMANNI, Dur. & Hilg. Villous-pubescent, much-branched, very leafy; leaflets 2–5″ long, obovate, roundish or oval-oblong; umbels 4–9-flowered, bract simple, peduncle often equaling the leaf; calyx loosely villous, teeth shorter than the campanulate tube; flowers 2″ long, keel very obtuse. See page 63.

(*b.*) Minutely pubescent, glabrate, diffusely procumbent; calyx-teeth short; seeded portions of the legume exserted beyond the calyx. California.

9. H. MICRANTHA, Nutt. Annual (?), slender, minutely villous; leaflets 5–6, obovate-oblong, 1½–3″ long; umbels 3-5-flowered, bractless, short-peduncled; flowers 1½″ long, keel obtusish.

10. H. PROSTRATA, Nutt. Silky-puberulent and glabrate, slender; leaflets 5–7, oblong-obovate, obtuse, 3″ long; umbels lax, 5–10-flowered, on slender peduncles, bract simple; calyx campanulate, teeth very short; flowers 3″ long.

§ 2. EUHOSACKIA, Benth. Legume linear, straight or nearly so, not rostrately attenuate; keel not falcately-attenuate, mostly very obtuse.

* Leaflets 3–6, crowded-pinnate or quasi-palmate; stipules glandular; peduncles 1–2-(rarely 3–4-) flowered; bract simple, rarely 3-foliolate; flowers yellow, claws not exserted, the vexillum hardly unguiculate, not apart, keel very short, rather straight and narrow. Perennial; stems branching, rigid.

(*a.*) Peduncles all exceeding the leaves.

11. H. RIGIDA, Benth. Silky or hoary-pubescent, 8–12″ high; leaflets 3–5, crowded, cuneate-oblong or obovate; calyx-teeth shorter than the tube.—Southern California to New Mexico.

12. H. PUBERULA, Benth. Appressed-puberulent; leaflets 3–6, less crowded, linear, lanceolate, or the lowest oblong; calyx-teeth attenuate, equaling the tube. See page 419.

(*b.*) Peduncles short, rarely equaling the leaf, sometimes wanting.

13. H. WRIGHTII, Gray. Ashy-puberulent, bushy-branched, very leafy; leaflets 3–5, apparently palmate and sessile, the lowest oblong, the rest filiform-linear; calyx-teeth setaceous-subulate, about equaling the tube; flowers rather large.—New Mexico. Running into the last.

* * Leaves pinnate, leaflets 5–21; umbels few- many-flowered, peduncled, bracts 1–5-foliolate or wanting; vexillum with a slender claw, more or less apart. Root perennial, except in *H. maritima.*

(*a.*) Peduncles 1–4-flowered, elongated; pedicels very short; stipules scarious, small; flowers yellow, claws a little exserted, keel broad and very obtuse.

14. H. LATHYROIDES, Dur. & Hilg. Low, ashy-puberulent; leaflets 5–7, not crowded, linear-lanceolate, acute at both ends; bract simple or wanting; calyx-teeth broad-subulate, shorter than the tube.—California.

15. H. ANGUSTIFOLIA, G. Don. Slender; leaflets 5–9, obovate or linear, short, often canescent beneath; peduncle 1–2-flowered, bract 3-foliolate; calyx-teeth slender, nearly equaling the tube.—Mexico.

(*b.*) Peduncles umbellately many-flowered, mostly shorter than the leaf, bracteate only below the apex; stipules scarious or foliaceous; flowers rather small, greenish-white or yellowish, keel slightly curved, very obtuse, a little shorter than the wings; calyx-teeth not half as long as the tube; leaflets 9–21, oval or oblong.

16. H. INCANA, Torr. Low, very hoary-villous; bract mostly 5-foliolate, near the umbel.—California.

17. H. STIPULARIS, Benth. Rather tall and stout, villous above, leaflets glabrate; stipules foliaceous, the upper sometimes nearly scarious; bracteal-leaf much below the umbel, 3–9-foliolate.—California.

18. H. CRASSIFOLIA, Benth. Tall and stout, stems nearly glabrous; leaflets 9–15, thickish, puberulent or glabrate; bract mostly 3-foliolate and above the middle of the peduncle; calyx-teeth very short.—Oregon and California.

(*c.*) Umbels 4–12- (or the lowest 1–3-) flowered, on peduncles usually equaling or exceeding the leaves; bract at the top or none; stipules scarious; flowers ½′ long or more, yellow with white or purple, the keel abruptly incurved, acutish, nearly equaling the wings; calyx-teeth at least nearly half as long as the tube; leaflets 5–11.

19. H. OBLONGIFOLIA, Benth. Appressed-pubescent; leaflets 9–11, narrowly oblong; bract simple; calyx-teeth a little shorter than the tube; otherwise like the next.—California.

20. H. BICOLOR, Dougl. Glabrous, rather tall; leaflets 5–9, obovate or oblong, bract none or rarely small, simple; calyx-teeth about half as long as the tube; keel often white.—Oregon and California.

21. H. GRACILIS, Benth. Glabrous, more slender, 8–12′ high, weak and spreading; stipules large; leaflets 5–7, often 3 below, obovate-cuneate; bract 3-foliolate, petioled; calyx-teeth nearly equaling the tube; keel and wings purplish.—California.

(*d.*) Peduncles several- (or the lowest 1–3-) flowered; bract at the apex, 1–3-foliolate, or none; stipules glandular, often deciduous; claws slightly, if at all, exserted; keel straightish, dilated above; legumes glabrous; leaflets 5–7.—California.

22. H. GRANDIFLORA, Benth. Usually tall, 1–5° high, more or less soft-pubescent; leaflets oval or oblong; peduncles elongated; flowers 7–11″ long, yellowish or greenish-white and purplish; calyx-teeth subulate, about equaling the tube or shorter; keel very much shorter than the ample wings.

23. H. MARITIMA, Nutt. Annual, diffusely spreading, strigose-puberulent or nearly glabrous; stems 8–12′ long; leaflets mostly 5, on a somewhat dilated rachis, succulent, oval or obovate, 4–6″ long; peduncles about equaling the leaves, 3–5-flowered; calyx-teeth linear-subulate, rather exceeding the tube; flowers 4–5″ long, bright-yellow, keel broad, about equaling the wings.

* * * Leaves pinnate, rachis more or less dilated; stipules glandular; peduncles 1- (rarely 2-) flowered; claws not exserted, that of the vexillum short, approximate to the others. Small diffuse annuals; flowers small, yellow.

24. H. STRIGOSA, Nutt. Strigosely pubescent, diffusely spreading or ascending; leaflets 4–9, linear-oblong or obovate, 1–5″ long; peduncles equaling or exceeding the leaves, the bract at the apex 1–5-foliolate or wanting; flowers 2–5″ long, keel broad, nearly straight, very obtuse, much shorter than the wings, vexillum tapering into a short claw.—California.

25. H. PARVIFLORA, Benth. Glabrous, pale; leaflets 3–6; peduncles 2–8″ long; bracts 1–3-foliolate; flowers barely 2″ long, keel narrow and inflexed above, acutish, nearly equaling the wings; vexillum subcordate.—Oregon, California.

§ 3. MICROLOTUS, Benth. Legume as in § 2, sometimes barely oblong; keel attenuated upward, falcate, mostly acute, equaling or exceeding the wings; claws not exserted, that of the vexillum short, not apart. Annual; leaflets 1–5, the lower scattered, rachis more or less dilated; stipules glandular; flowers small, yellow, not umbellate.

(*a.*) Peduncles exceeding the leaves, 1-flowered, with a simple bract; leaves subsessile, pinnately 3-foliolate or sometimes simple above; calyx-teeth much exceeding the tube, nearly equaling the corolla.

26. H. PURSHIANA, Benth. Variable. See page 63.

(*b.*) Flowers subsessile and mostly solitary in the axils, bractless; corolla exceeding the calyx; leaf-

lets 3–5, obovate or oblong, scattered on the winged rachis. Small procumbent or depressed annuals.

27. H. SUBPINNATA, T. & G. Villous-hirsute or glabrate. See page 62.

28. H. BRACHYCARPA, Benth. Softly long-villous, much branched from the base; flowers larger; calyx-teeth very much exceeding the tube and equaling or half as long as the oblong or linear-oblong very obtuse villous 2–4-seeded legume.—California.

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## ASTRAGALUS.

With the following very closely allied genus *Oxytropis*, mainly as revised by Dr. GRAY, *Proc. Amer. Acad.*, Vol. VI, pp. 188–234, (1863,) with the addition of the newer species. The grouping is retained as far as possible, though not always very satisfactory. The order is from the perfectly 2-celled species, through the imperfectly 2-celled, to those with strictly 1-celled legumes.

Series I. ASTRAGALUS, L. Pod completely or imperfectly 2-celled by the intrusion of the dorsal suture, the ventral suture being not at all or less deeply inflexed. §§ 1–16.

§ 1. SARCOCARPI. Pod plum-shaped, succulent, becoming thick and fleshy, indehiscent, not stipitate, septum complete. Perennials, with low leafy stems; stipules distinct, nearly free; racemes short, spike-like.

* Ovary and pod glabrous.

1. A. CARYOCARPUS, Ker. Grayish with an appressed pubescence; flowers violet; pod globose or ovate, usually pointed.—Saskatchewan to Texas.

2. A. MEXICANUS, A. DC. Taller, greener, less pubescent; flowers lighter colored or white; calyx softly white-villous or tomentose; pod ovate-globose, scarcely pointed.—Missouri to S. Texas and the base of the Rocky Mts.

* * Ovary hoary-hirsute; pod sometimes becoming glabrate.

3. A. PLATTENSIS, Nutt. Loosely villous; stipules rather large; flowers ochroleucous or purplish above; pod ovate, acuminate, or oblong and somewhat curved.—Illinois to N. Alabama and west to Nebraska and Texas.

§ 2. DIPHYSI. Pod ovate or globose, membranous, inflated, nearly glabrous, sessile, completely 2-celled and more or less didymous by the intrusion of both sutures, many-seeded. Perennial, many-stemmed; pubescence short or wanting; stipules distinct, subadnate; flowers rather small, white to purple or yellowish, spicate or subcapitate.

4. A. DIPHYSUS, Gray. Nearly glabrous throughout. See page 65.

5. A. LENTIGINOSUS, Dougl. More or less cinereous-pubescent. See page 65.

6. A. PLATYTROPIS, Gray. *Proc. Amer. Acad.* 6. 526. Dwarf and alpine; silvery-silky. See page 66.

7. A. COULTERI, Benth., (*Arthu-Schottii*, Gray,) may belong here, but annual; pubescence appressed-silky; pod canescent or "silky-villous," 7–8″ long, chartaceous. Placed in § 16 by Dr. Gray.

§ 3. CHÆTODONTES. Pod ovate, small, sessile, coriaceous, turgid or at times subcompressed, more or less sulcate on the back, septum perfect, cells 3–4-ovuled. Perennial, many-stemmed, leafy, white silky-villous; flowers rather small, yellowish, spicate, spreading; calyx-tube short.

* Leaflets 10–12 pairs, narrow, usually acute; stipules free, subulate; calyx-teeth setaceous, little shorter than the corolla.—Washington Territory.

8. A. SPALDINGII, Gray. *Proc. Amer. Acad.* 6. 524. (*A. chætodon*, Torr.) Villous-pubescent, 1° high; leaflets 3–6″ long, lanceolate or oblong-linear; peduncles exceeding the leaves; spike oblong, dense or rather loose at base; flowers nearly 5″ long; bracts setaceous; calyx very villous; pod 2½–3″ long, villous, scarcely sulcate, 2–4-seeded.

9. A. LYALLI, Gray. White-silky; spike long, loose; peduncles shorter; flowers 3″ long; calyx villous, the tube equaling the teeth; pod hoary, more deeply sulcate; otherwise like the last.

* * Leaflets 1–5 pairs, oblong or ovate; stipules adnate, short; calyx-teeth subulate, shorter than the tube; pod compressed.

10. A. CALYCOSUS, Torr. Dwarf, white-silky; spike 2–6-flowered. See page 66, and Plate XIII.

§ 4. MOLLISSIMI. Pod cartilaginous or coriaceous, sessile, oblong, turgid, terete, sulcate at both sutures, at length incurved, septum perfect. Perennial, subacaulescent, shining with a soft silky-

villous often yellow pubescence; peduncles long, scape-like; spikes dense; flowers rather large, violet; calyx tubular.

11. A. MOLLISSIMUS, Torr. Pod narrow-oblong, 5–9″ long, glabrous, subdidymous; ovary also glabrous.—Nebraska to W. Texas.

12. A. BIGELOVII, Gray. Pod oval-oblong, 6″ long, coriaceous, densely woolly, but slightly sulcate.—W. Texas; New Mexico; Chihuahua.

§ 5. ULIGINOSI. Pod coriaceous, turgid, oblong, terete, scarcely sulcate and only on the back, nearly straight, sessile, septum perfect. Perennial, tall, with appressed gray pubescence or glabrate; spikes dense; flowers whitish, ochroleucous or purplish, spreading or deflexed; pods erect, crowded, 6″ long; stipules distinct or united, free.

13. A. CANADENSIS, L. See pages 67, 68.

§ 6. ONOBRYCHIDES. Pod coriaceous, oblong or ovate, straight, usually more or less compressed- or obcompressed-triangular, dorsally sulcate, (cross-section obcordate,) 2-celled, pubescent, many-ovuled. Perennial, caulescent, grayish short-pubescent or glabrate, ascending or decumbent; stipules more or less sheathing; flowers in dense spikes or small heads, middle-sized, violet or purple, ascending; pods ascending.

14. A. ADSURGENS, Pall. Rather stout; spike oblong; pod sessile. See page 68.

15. A. HYPOGLOTTIS, L. Slender; flowers capitate; pod short-stipitate. See page 68.

§ 7. REFLEXI. Pod thick-coriaceous, sessile, deflexed, ovate-triangular, very deeply sulcate dorsally, (section obcordately 2-lobed,) 2-celled, cells 3–4-ovuled; keel falcate, attenuate upward, equaling the narrow banner, exceeding the wings. Annual, slender, pilose-pubescent; leaflets emarginate; flowers nearly sessile, rather few, subcapitate, bluish-white, spreading.

16. A. REFLEXUS, T. & G. Flowers scarcely 3″ long; pod 4″ long, glabrous.—Texas, (Drummond.)

§ 8. DIDYMOCARPI. Pod thin-coriaceous, obcompressed-didymous with a narrow perfect septum, transversely ridged or reticulated, at length separating into two 1–2-seeded divisions, mostly deflexed; ovary short-stipitate. Annual, caulescent, rather small, sparingly pubescent; stipules distinct, nearly free; leaflets emarginate; spikes short, dense; flowers small, violet or whitish, keel strongly inflexed.

17. A. DIDYMOCARPUS, H. & A. Flowers sessile; pod small, strongly rugose, hirsutish, scabrous or glabrate; cells 1-ovuled, nearly filled by the seed; stipe very short.—California.

18. A. BRAZOENSIS, Buck. Flowers rather loose, pedicels very short; pod strongly obcompressed and nearly disk-like, 3″ broad, incurved, glabrous, transversely nerved; cells 2-ovuled, mostly 1-seeded; stipe equaling the calyx.—W. Texas.

§ 9. MICRANTHI. Pod coriaceous, oblong, lanceolate, or linear, straight or curved, sessile, dorsally sulcate, ventral suture rather prominent, 2-celled, many-ovuled. Low or slender, mostly annual, caulescent; stipules distinct, nearly free; flowers small or approaching middle-size, violet or whitish, keel incurved above or very obtuse; calyx-tube short.—Species dissimilar.

* Flowers and pods deflexed, numerous, densely spiked; peduncles elongated; 1° high or more, strigose-puberulent.

19. A. VACCARUM, Gray. Perennial, cinereous-puberulent; calyx-teeth equaling the tube; corolla incurved, white or purplish; pod lance-oblong, arcuate, hirsutish, section broad-obcordate.—Arizona.

20. A. HARTWEGI, Benth. Greener; calyx-teeth shorter than the tube; corolla nearly straight.—Arizona; Mexico. Pod unknown.

* * Flowers rather few in a loose raceme, and pods pendent; low, glabrous.

21. A. COBRENSIS, Gray. Diffuse; leaflets retuse; pedicels nearly equaling the calyx-tube; corolla purplish; ovary short-stipitate; pod obcompressed, oblong, straight, broadly concave on the back, sessile.—New Mexico.

* * * The few capitate flowers and oblong pods erect; calyx-teeth subulate-linear, much exceeding the tube, equaling the corolla. Annual, low, villous-hirsute.

22. A. WRIGHTII, Gray. Pod straight, subcompressed, bicarinate, acute, half-longer than the calyx; style very short.—Texas.

* * * * Flowers few, subcapitate or subsolitary, rather small, apex of the keel slightly produced, inflexed, banner much longer; pod linear, subcompressed, bicarinate. Annual, low, diffuse; leaflets mostly retuse.

23. A. NUTTALLIANUS, DC. Pods curved. See page 68.

24. A. LEPTOCARPUS, T. & G. Subglabrous; pods 1′ long, thin, straight, spreading, less reticulated, glabrous; corolla 4–5″ long, curved apex of the keel narrower.—Arkansas; Texas.

* * * * * Flowers larger, many, loosely spiked, apex of the keel produced, inflexed, obtuse; pod (immature) oblong-linear, sub-obcompressed. Perennial, procumbent; leaflets linear, acute.

25. A. ARIZONICUS, Gray. *Proc. Amer. Acad.* 7. 398. Woody at base, hoary with a strigulose pubescence; leaflets 5–7 pairs; peduncles exceeding the leaves; calyx-teeth subulate, equaling the campanulate-tube; corolla 6″ long, white, purplish above.—Arizona.

§ 9[a]. Anomalous species. Pod chartaceous, sessile, 9–12″ long, linear- or lance-oblong, arcuately incurved, subcompressed, somewhat sulcate dorsally, ventral suture acute, 2-celled, many-seeded, deflexed. Perennial, caulescent, pubescent or villous; stipules adnate to the petiole, distinct; spikes many-flowered; flowers 6–9″ long; peduncles exceeding the leaves.

26. A. ANDERSONII, Gray. Pubescence soft; spikes short. See page 67.

27. A. MALACUS, Gray. More rigidly villous; spike elongating. See page 67.

§ 9[b]. Anomalous and rather diverse species, near § *Oroboidei*, but with the pods completely 2-celled or very nearly so, and more symmetrical and terete; caulescent, perennial, (except *A. tener.*)

* Pod curved.

28. A. BOLANDERI, Gray. *Proc. Amer. Acad.* 7. 337. Cinereous-puberulent, about 1° high; stipules short, scarious, sheathing; leaflets 6–9 pairs, sublinear and oblong; peduncles shorter than the leaf, capitately many-flowered; pedicels very short, reflexed in fruit; calyx-teeth subsetaceous, little shorter than the cylindrical tube; pod coriaceous, ovate, 8–9″ long, 3–4″ broad, obcompressed, turgid, hamately incurved, acute, stipitate, glabrous, many-seeded, septum perfect; stipe 4″ long.—Yosemite Valley, (Bolander.)

* * Pod straight.

29. A. ARRECTUS, Gray. Pod oblong, stipitate, erect upon a spreading pedicel. See page 69.

30. A. ATRATUS, S. Watson. Pod linear, short-stipitate, pendent. See page 69, and Plate XIV.

31. A. OBSCURUS, S. Watson. Pod linear, sessile, erect. See page 69.

32. A. TENER, Gray. Annual, a span high, erect, strigulose with very short black and whitish hairs; stipules small, ovate, scarious; leaflets 5–7 pairs, linear-cuneate or nearly linear, broadly emarginate or obtuse; flowers few, capitate, violet, the wings and especially the banner much exceeding the keel; immature legume more or less deflexed, 6″ long, lance-linear, silky-puberulent, short-stipitate, 10–12-ovuled, 2-celled, the cross-section obcordate.—California.

§ 10. SUCCUMBENTES. Pod chartaceous-coriaceous, sessile, long-linear, strongly compressed, falcate upward, bicarinate and deeply sulcate on the back, the ventral suture prominent and acute, 2-celled, cross-section Y-shaped. Low, diffuse, flexuous; peduncles short; stipules free, distinct; flowers ¾′ long, rather loosely capitate, purplish; calyx cylindric.

33. A. SUCCUMBENS, Dougl. Cinereous-hirsute; leaflets obovate; pods erect on spreading pedicels, shining, reticulated.—Oregon.

§ 11. GALEGIFORMES. Pod exsert-stipitate, pendent, coriaceous- or cartilaginous-chartaceous, very glabrous, straight, narrow, more or less triangular, very deeply sulcate dorsally, the suture intruded to the middle or beyond. Perennial; stems erect, stout, sulcate, very leafy; stipules distinct, free; flowers in long crowded racemes, rather large, white.

34. A. DRUMMONDII, Dougl. Softly villous; calyx scarcely gibbous at base, black-hairy, the subulate teeth shorter than the tube; pod long-linear, terete with a very deep narrow sulcus, completely or incompletely 2-celled, cross-section obcordately 2-lobed; stipe exceeding the calyx-teeth.—Saskatchewan to Nebraska and the Rocky Mts.

36. A. RACEMOSUS, Pursh. Appressed-pubescent, glabrate; calyx strongly gibbous at base, whitish-puberulent, the setaceous teeth slightly shorter than the tube, equaling the stipe; pod lance-oblong, triangular, not 2-celled, cross-section somewhat equally triradiate.—Nebraska to Idaho.

§ 12. OCREATI. Pod sessile, coriaceous, obcompressed or obcompressed-triangular, with the impressed dorsal suture more or less approaching the ventral, but not 2-celled. Low or prostrate perennials, caulescent with appressed hairs or strigose; stipules free from the petiole, united; flowers spicate, scarcely middle-sized; calyx-tube usually campanulate.

36. A. FLAVUS, Nutt. Diffuse, with a fine hoary pubescence; stipules sheathing the stem and base of the petiole, oblique; leaflets linear, subacute; flowers deep-yellow; pod 4″ long, half-included, hoary, ovate, straight, both sutures impressed and approximate.—Rocky Mts., lat. 41°, (Nuttall.)

37. A. HUMISTRATUS, Gray. Strigose-hairy, subglabrate; stems long, procumbent; stipules scarcely sheathing; leaflets lanceolate or linear-oblong, acute; flowers purple, spreading; calyx-teeth exceeding

the tube; banner whitish, veined; keel inflexed, with a narrow produced apex; pod oblong-linear curved, pubescent, obcompressed-triangular, dorsal suture intruded, the ventral prominent and carinate.—New Mexico and Arizona.

38. A. OREGANUS, Nutt. Dwarf, hirsutish-canescent; stipules scarcely sheathing; leaflets obovate, emarginate; flowers ochroleucous (?), spicate-capitate upon a short peduncle, rather large; calyx-tube cylindric, twice longer than the teeth; ovary septate nearly to the middle; pod not known.—Rocky Mts., (Nuttall.)

§ 13. MICROLOBI. Pod 2–3″ long, sessile, coriaceous or cartilaginous, 6–7-ovuled, elliptic-ovate, either nearly terete and scarcely flattened on the back or broadly concave, always wholly 1-celled, the ventral suture thick and prominent. Perennial, subcinereous; stems erect or ascending, slender, rather rigid, 1° high or more; leaflets 5–8 pairs, linear; lower stipules somewhat united, the rest distinct; racemes spikelike, many-flowered, virgate; flowers small, purple, recurved-spreading; calyx and teeth short.—Missouri and Nebraska to the Rocky Mts.

39. A. GRACILIS, Nutt. Stems virgate; leaflets nearly filiform, 7–10″ long, obtuse or retuse; racemes dense, elongated, long-peduncled; flowers 3″ long, pale-purple or whitish; pods spreading, coriaceous, strongly concave on the back, white-hairy, at length glabrous, transversely rugose-veined, the ventral suture subacute.

40. A. MICROLOBUS, Gray. Stems diffuse; leaflets 4–6″ long, linear or oblong-linear, emarginate; racemes rather short and usually loosely-flowered; flowers deep-purple, 4″ long; pods reflexed, thick-cartilaginous, puberulent, finely rugulose, turgid, a little flattened on the back, the ventral suture very thick.

§ 14. OROBOIDEI. Pod stipitate or sessile, coriaceous or nearly membranous, scarcely or not at all obcompressed, 1-celled or imperfectly 2-celled, with the dorsal suture more or less deeply impressed or inflexed. Caulescent, slender, glabrous or pubescent; stipules nearly free, distinct except the lowest; flowers in short often spikelike racemes, or few in small heads, rather small or middle-sized, purple to white, spreading; calyx short.

* Northern, perennial, ascending; flowers pedicelled, mostly racemed; pods oblong, stipitate, (stipe very short in *A. oroboides* and *sparsiflorus*,) subsecund, usually pendent, the ventral suture rather prominent.

(*a.*) Pod membranous, glabrous or finely puberulent, slightly more compressed laterally, 1-celled with a very narrow rudimentary septum from the straight dorsal suture, the ventral suture gibbous.

(1.) Pod long-stipitate, not sulcate, cross-section oval; leaflets never retuse, the lowest pair approximate to the stipules except in the lower leaves; flowers in a close raceme, white or bluish, keel violet.

41. A. ABORIGINUM, Rich. Puberulent or subvillous; pod semi-elliptic. See page 70.

42. A. GLABRIUSCULUS, Gray. Glabrous or with short scattered hairs; leaflets thinner, green, linear-lanceolate and subacute, or oblong and obtuse at both ends; ovary glabrous; pod lanceolate-subfalcate, attenuate into a stipe 2–3 times exceeding the calyx; otherwise like the last, of which it is "probably only a variety."—Rocky Mts. of British America and Colorado.

(2.) Pod short-stipitate, not dorsally sulcate or very obsoletely so, (the cross-section obovate, retuse,) minutely darkish-pubescent; leaflets subretuse; flowers white, 4″ long.

43. A. ROBBINSII, Gray. Subglabrous; stems 1° high, suberect; leaflets 3–5 pairs, oval or oblong; raceme close, oblong; calyx-teeth much shorter than the tube; pods thin-membranous, oblong, straight or somewhat incurved, 6″ long, very obtuse and abruptly narrowed at base into an included stipe.—Vermont. See page 70.

(*b.*) Pod more coriaceous, black- or rarely cinereous-pubescent, more or less triangular and semi-2-celled, the dorsal suture sulcate-impressed.

(1.) Pod somewhat symmetrical, short, oblong lens-shaped, slightly compressed, cross-section obcordate, the ventral suture a little the more gibbous.

44. A. OROBOIDES, Hornem., Var. AMERICANUS, Gray. Subcinereous-puberulent; stems suberect, 1–1½° high; leaflets 5–7 pairs, oblong and oval or often linear-oblong, scarcely retuse; flowers 3–4″ long, in a long secund raceme, violet or purple, the wings exceeding the keel; pod 5–6″ long, 3–4 times longer than the calyx, the appressed pubescence usually gray, moderately sulcate, few-seeded; stipe very short.—Labrador, on the Saskatchewan, and in the Rocky Mts. to Colorado.

(2.) Pod triangular, more impressed, the cross-section deeply obcordate, rather straight or incurved, gibbous on the back. Leaves sometimes retuse or subemarginate.

45. A. ALPINUS, L. Hairy-pubescent or glabrous, diffuse; leaflets 6–12 pairs, oval or oblong; ra-

cemes short or subcapitate, many-flowered; flowers 5–6″ long, violet or whitish, wings little if at all exceeding the rather large keel; pod oblong, straight or recurved, black-villous or -pubescent, triangular-turgid, the suture intruded to the middle or beyond, stipe usually exceeding the calyx.—Arctic America; Labrador; Maine and Vermont; Wyoming and Colorado.

46. A. SPARSIFLORUS, Gray. Slightly appressed-pilose, glabrate; stems very slender, branched, diffuse; stipules triangular-subulate, distinct; leaflets 4–6 pairs, obovate or subrounded, often emarginate, 2–3″ long; peduncles scarcely exceeding the leaves, 3–10-flowered; flowers 3″ long, bluish-white, the emarginate or bifid banner and the wings much exceeding the incurved keel; calyx-teeth equaling the tube; ovary 8–12-ovuled, short-stipitate; pod 3–6″ long, coriaceous, oblong, incurved, pubescent with short hairs, mottled, 2-celled to the middle, very short-stipitate, ventral suture acute.—Colorado.

* * Californian, annual, low, erect; flowers few, capitate; wings and banner much exceeding the keel; ovary silky-canescent, sessile; pod unknown.

47. A. BREWERI, Gray. About a span high, with very short black and whitish hairs; leaflets 4–5 pairs, oblong-obcordate; stipules small, ovate, scarious; immature pods globose-ovate, erect, crowded, 6-ovuled, twice longer than the calyx, dorsal suture slightly intruded.

* * * Southern and eastern species; racemes spikelike, most usually short; calyx never black-hairy; pod glabrous, reticulated, sessile or scarcely stipitate, oblong, incurved.

48. A. LINDHEIMERI, Eng. Annual, many-stemmed, diffuse, glabrous; leaflets 6–8 pairs, narrow-oblong, mostly emarginate; raceme subcapitate; calyx-teeth subulate-setaceous, about twice longer than the tube; corolla violet, ½′ long; keel rather large, little shorter than the wings and broad scarcely emarginate banner; pod ascending, upon a spreading pedicel, oblong-linear, 1′ long or more, subfalcate, compressed, transversely reticulate-veined, substipitate, bicarinate on the back and 2-celled to the middle, ventral suture acute.—Texas.

49. A. DISTORTUS, T. & G. Perennial, low, diffuse, many-stemmed, subglabrous; leaflets 8–12 pairs, oblong, emarginate; flowers in a short spike, 4″ long, narrow, pale-purple; calyx-teeth broad-subulate, half-shorter than the dark-puberulent tube; banner deeply emarginate; pods 6–9″ long, ovate- or lance-oblong, arched, thick-coriaceous, minutely reticulated, subterete, 1-celled, sulcate at the sutures, especially on the back.—S. Illinois, Arkansas and Texas.

50. A. OBCORDATUS, Ell. Perennial, low, diffuse; leaflets 7–12 pairs, obcordate; flowers pale-purple, 4″ long; pods 1′ long, lunate, sulcate dorsally, ventral suture acute.—Florida, Georgia.

51. A. GLABER, Mx. Perennial, tall, erect; leaflets 9–18 pairs, elliptic- or linear-oblong; flowers 6″ long, white; pods oblong-linear, 1′ long, arcuate or straightish, sulcate on the back and 2-celled to the middle, ventral suture prominent.—N. Carolina to Florida.

§ 15. LOTIFLORI. Perennial and nearly like the last division of § *Oroboidei*, but villous or canescent, lower, and with yellowish flowers; pod semi-ovate or oblong, turgid, coriaceous, subtriangular, with the back gibbous and more or less impressed, the ventral suture prominent; corolla little exceeding the calyx, the keel inflexed above; calyx-teeth exceeding the tube.

52. A. VILLOSUS, Mx. Loosely villous; stems a span high, ascending; leaflets oval, retuse; heads many-flowered, long-peduncled; corolla 4″ long; pod very villous, 2-celled nearly to the middle, cross-section obcordate.—S. Carolina to Florida and Louisiana.

53. A. LOTIFLORUS, Hook. Hoary or cinereous with appressed hairs; stems very short; leaflets lance-oblong; peduncles exceeding the leaves or very short; heads few-flowered; calyx-teeth subulate, exceeding the tube; pod about 1′ long, oblong-ovate, more inflated, subcanescent, the cross-section obovate, retuse, or usually broadly obcordate toward the base.—From Texas and Nebraska to the Rocky Mts. and Hudson's Bay.

§ 15ᵃ. (PTEROCARPI.) Pod sessile, coriaceous, oval, 1′ long or more, strongly obcompressed and laterally winged, acute and compressed at the apex, glabrous, transversely rugose-veined, slightly sulcate, the dorsal suture nearly meeting the subdepressed ventral one. Perennial.

54. A. PTEROCARPUS, S. Watson. See page 71, and Plate XII.

§ 16. ARGOPHYLLI. Pod sessile, (except in *A. Beckwithii*,) mostly thick-coriaceous and obcompressed, the impressed or intruded dorsal suture more or less approaching the ventral, not 2-celled, pubescent. Low, white-silky or hoary; stipules distinct, nearly free; flowers spicate or subcapitate, violet or purplish; calyx-teeth shorter than the usually oblong or cylindric tube.

* Annual or biennial, many-stemmed; flowers rather small, purplish-white; pod inflated, membranous, incurved.

55. A. PUBENTISSIMUS, T. & G. Dwarf, hirsute-canescent with a loose pubescence; leaflets oblong or obovate; flowers few, subracemose upon a short peduncle; calyx-teeth equaling the campanulate

tube; pod villous, 9–10″ long, ovate-lunate, strongly incurved, sulcate on the back with a slight introflexion of the suture.—Colorado, (Nuttall.)

* * Perennial, short-stemmed or scarcely caulescent, usually prostrate or matted; flowers rather large, shortly pedicelled, mostly violet; leaflets oblong, elliptic or obovate. Pod thick-coriaceous, obcompressed or obcompressed-triangular, transversely rugulose.

56. A. MISSOURIENSIS, Nutt. Subcaulescent, hoary-silky with a short very closely appressed pubescence; peduncles scapelike, capitately few-flowered or spicately 8–14-flowered; calyx-teeth about half-shorter than the cylindric tube; corolla bright violet, (or rarely white;) pod about 1′ long, nearly straight, blackish, elliptic.—From the Saskatchewan to Nebraska and New Mexico.

57. A. SHORTIANUS, Nutt. Usually subacaulescent, silky-canescent with a very closely appressed pubescence; leaflets obovate or ovate, 7–10″ long; peduncles scapelike, few–many-flowered, usually shorter than the leaves; calyx ½′ long, cylindric, teeth half-shorter than the tube; corolla violet or blue; immature pod 1½–2′ long, ovate-lanceolate, pointed and strongly arcuate, thick, puberulent.—N. Colorado. Var. (?) MINOR has smaller leaflets and the pod oblong- or lanceolate-linear, the dorsal suture deeply intruded, carinate ventrally.—W. Texas and New Mexico to Nebraska and Colorado.

58. A. PARRYI, Gray. Stems short, prostrate; villous with loose spreading hairs; peduncles rather short; flowers 6–10, loosely subcapitate, 6–8″ long, whitish or yellowish, the keel tinged with purple; calyx-teeth half-shorter than the cylindric tube; pod pubescent, oblong-lanceolate, 1′ long or more, arched or at length circinate, strongly obcompressed and rugulose, both sutures sulcately impressed, contiguous.—Colorado to N. W. Texas.

59. A. IODANTHUS, S. Watson. Subglabrous; spikes dense. See page 70.

60. A. BECKWITHII, T. & G. Subglabrous; raceme loose; pod short-stipitate. See page 71.

61. A. GLAREOSUS, Dougl. Depressed, villous-silky with white incumbent hairs; flowers 3–6, narrow, 9–12″ long, on peduncles not exceeding the leaves, bright violet; calyx-teeth one-third as long as the long-cylindric tube; pod (immature) oblong-ovate, attenuate above, incurved, silky-pubescent, "becoming subglabrous."—S. Idaho; Wyoming.

Series II. PHACA, L. Pod 1-celled, neither suture being inflexed or the ventral more intruded than the dorsal. § § 17–27.

(A.) Leaves pinnate with many or rarely with few or abortive leaflets, or simple.

§ 17. ERIOCARPI. Pod very woolly, short, turgid, coriaceous, more or less incurved, acuminate or pointed, sessile. Very soft-woolly; stems short, prostrate, from a stout perennial root; flowers usually 1′ long, loosely subcapitate; calyx long-cylindric.

62. A. INFLEXUS, Dougl. Cinereous-hoary with loose subvillous wool; stems 6–12′ long, diffuse-procumbent; leaflets oblong; flowers 1′ long, bright-purple, the keel little exceeding the loose slender setaceous calyx-teeth; pod ovate-oblong, very woolly when young, becoming somewhat naked, strongly incurved, obcompressed, both sutures impressed, the ventral one more so.—Idaho; Washington Territory.

63. A. ERIOCARPUS, S. Watson. Pubescence rather hirsute-silky. See page 72.

64. A. PURSHII, Dougl. Flowers ochroleucous; leaflets lanceolate or oblong. See page 72.

65. A. UTAHENSE, T. & G. Flowers dark-purple; leaflets subrounded. See page 72.

§ 18. OOCARPI. Pod chartaceous-coriaceous, ovate, inflated, sessile, glabrous, ventral suture intruded, the dorsal obsoletely so. Glabrate, perennial, erect, leafy; stipules free, distinct; leaflets oblong and oval, sometimes retuse; flowers many in a spikelike raceme, white or whitish, ½′ long; calyx short; pod erect, not over 1′ long.

66. A. COOPERI, Gray. Leaflets oblong; calyx dark-pubescent, teeth subulate; pod ovate-globose, sub-obcompressed, slightly sulcate on both sides, cavity webby.—W. New York to Wisconsin.

67. A. OOCARPUS, Gray. 4–6° high; leaflets oval, rather small, thickish; flowers spreading, in a rather loose raceme; calyx whitish-puberulent, teeth very short; pod oblong-ovate, acute, slightly sulcate only ventrally and that suture introflexed, glabrous within.—S. California.

§ 19. INFLATI. Pod membranous, inflated, globose, egg-shaped or semi-ovate, usually large, finely reticulated, glabrous or glabrate, neither suture inflexed or rarely the ventral only and slightly.

* Annual; pod sessile, not mottled; flowers small, ochroleucous or purplish. Low; leaflets linear or linear-oblong, gray with strigulose hairs.

68. A. TRIFLORUS, Gray. Very much branched from the base; flowers 3–15; pod oval, obtuse or acutish, 7–12″ long.—Arizona, Mexico.

69. A. GEYERI, Gray. Flowers few, yellowish-white; pod ovate-lunate. See page 72.

* * Root perennial, (annual ? in *A. pictus*;) pod mottled, short-stipitate, the stipe equaling the calyx; flowers few, rather small, light-colored, keel with the inflexed apex somewhat produced.

70. A. PICTUS, Gray. Hoary with a loose silky pubescence; roots filiform; stipules subulate, rigid, persistent, connate at base; leaflets 3–7-pairs, narrowly linear or filiform, ½–1½′ long, most of them usually abortive; pod ½–1½′ long, ovoid, scarcely pointed, pendent.—Nebraska and New Mexico, in sand.

71. A. HOOKERIANUS, Gray. Very low, subalpine; pod 1–2′ long, very obtuse. See page 73.

72. A. WHITNEYI, Gray. *Proc. Amer. Acad.* 6. 526. Strigulose-puberulent, densely branched, a span high; stipules short, sheathing, not scarious; leaflets 5–9 pairs, linear-oblong; peduncles equaling the leaf, subcapitately many-flowered; calyx-teeth triangular, 4-times shorter than the campanulate tube; corolla bright-purple, ½′ long, the keel falcate-incurved, equaling the wings, a little shorter than the banner; pod pendent, glabrous, oval, less than 1′ long, very obtuse at the apex.—Sierras of California.

73. A. OOPHORUS, S. Watson. Stems stout, 1–2° long, glabrous; pod 2′ long. See page 73.

* * * Perennial; pod not mottled.

(*a*.) Nearly stemless, few-flowered; pod with a very short stipe.

74. A. MEGACARPUS, Gray. Glabrous; leaflets 4–6 pairs, broadly oval or ovate, usually emarginate; scape 3–6-flowered, much shorter than the leaves; flowers 1′ long, ochroleucous or whitish; calyx cylindric, the teeth subulate, long, little shorter than the keel; pod ovate-oblong, 2–2½′ long, acuminate, very obtuse at base, erect.—"Plains of the Rocky Mts.," (Nuttall.)

(*b*.) Caulescent, rather tall, leafy; leaflets many-paired, oblong or sublinear; racemes or spikes mostly many-flowered.

(1.) Pod sessile, over 1′ long, (except *A. Hornii*,) the ventral suture straight or slightly convex, the dorsal strongly gibbous.—Californian.

(1ª.) Corolla yellow or yellowish, rather small, short, incurved above the calyx, the keel inflexed; peduncles not exceeding the leaves.

75. A. DOUGLASII, Gray. Ascending, subglabrous or somewhat ashy-puberulent; stipules triangular, distinct; leaflets 10–14 pairs, linear-oblong or lanceolate, obtuse or acutish; racemes short, loosely flowered; calyx-teeth broad-subulate, shorter than the tube; pod gibbous-ovoid, the ventral suture nearly straight.

76. A. MACRODON, Gray. Ascending or erect, villous-hoary or sometimes rather glabrous; stipules lanceolate-subulate, distinct; leaflets 11–14 pairs, linear-oblong, obtuse, mucronate; racemes rather short; flowers at length deflexed; calyx silky, the teeth filiform-subulate, lax, equaling the tube, little shorter than the yellow corolla. Pod unknown.

77. A. HORNII, Gray. *Proc. Amer. Acad.* 7. 398. Erect, 2° high, glabrous; stipules very small, subulate, distinct, soon reflexed; leaflets oblong-linear, slightly appressed-hairy; peduncles equaling the leaves, capitately many-flowered; flowers nearly sessile; calyx half-shorter than the yellow straightish corolla, the subulate teeth equaling the short campanulate tube; pods ⅝′ long, crowded, short-ovate, acuminate, pilose, 10–15-seeded.

(1ᵇ.) Corolla white or purplish-ochroleucous, long-exserted, straight with a subincurved apex, the claws of the wings and keel about equaling the lamina; peduncles exceeding the leaves; racemes elongating, the flowers many and crowded, becoming deflexed; leaflets in many pairs, crowded, usually retuse, the lowest near the stem.

78. A. CROTALARIÆ, Gray. Glabrate or subglabrous; stem stout, ascending; stipules triangular, distinct; leaflets linear- or obovate-oblong, 6–16″ long, not sessile; flowers white, 6–8″ long; pod ovoid, 1–1½′ long, chartaceous, more rigid and less inflated than in the next.

79. A. MENZIESII, Gray. Villous-canescent, the decumbent stem becoming glabrous; stipules scarious, connate; leaflets subcuneate-oblong, subsessile; pod ovoid, nearly 2′ long, thinly membranous.

(2.) Pod with a stipe equaling the calyx, otherwise as in (1.); stipules scarious, connate nearly to the top.

80. A. CURTIPES, Gray. Erect, 1° high, hoary with a minute appressed pubescence, at length glabrate; stipules rather large; leaflets 12–16 pairs, oblong or linear-oblong, retuse, petiolulate, glabrous above; fruiting raceme short; calyx-teeth slender-subulate, a little shorter than the campanulate tube; pod 1½′ long, puberulent, glabrate, semi-ovoid, scarcely pointed at each end, jointed upon the rigid stipe.—S. California.

(3.) Pod 8–18″ long, stipe rather long or very long, the ventral suture slightly convex, straight, or a little concave; stipules distinct; flowers white or yellowish, nearly straight.

(3ª.) Pod not attenuate at base or scarcely so, the stipe much exceeding the calyx; racemes short, oblong, on peduncles much exceeding the leaves; stipules small.—Californian.

81. A. LEUCOPSIS, T. & G. Finely tomentose-hoary or at length cinereous; leaflets 10–18 pairs, ob-

long or sublinear, obtuse or retuse; calyx more or less pubescent, the teeth subulate, half-shorter than the short-campanulate tube; corolla ochroleucous; ovary canescent; pod glabrous, 1–1½′ long, subattenuate at base, the stipe 5–6″ long.—Coast of S. California.

82. A. LEUCOPHYLLUS, T. & G. Silky-hoary; leaflets 10–18 pairs, broad-linear or lanceolate, obtuse or acutish; calyx silky, the teeth narrowly subulate, half-shorter than the oblong tube; corolla apparently yellowish; ovary and stipe silky-canescent, the pod at length glabrous, 1½′ long, oval-gibbous, very obtuse at each end, the filiform stipe 1′ long.

83. A. TRICHOPODUS, Gray. Ashy-puberulent, glabrate, stems 1½–3° long; leaflets 11–19 pairs, linear-oblong, obtuse; calyx dark-pubescent, the campanulate tube much exceeding the subulate teeth; corolla ochroleucous, 4½–6″ long; ovary glabrous; pod 8–9″ long, ellipsoid, very obtuse at each end, but little gibbous; stipe 6″ long, very slender, minutely pubescent.

(3ᵇ.) Stipes less exserted; pod pointed at each end.

84. A. OXYPHYSUS, Gray. Very softly hoary-villous, stems 3° long; stipules scarious; leaflets 8–11 pairs, oblong, 1′ long or less, from hoary becoming green; peduncles much exceeding the leaves; raceme elongated; bracts subulate, small; calyx silky, the subulate teeth half-shorter than the cylindric tube; flowers narrow, 9″ long, white or greenish-white; pod obovate-clavate, 1½–2′ long, glabrate, acutely acuminate and long-attenuate at base, stipe 3–4″ long, recurved, pubescent.—California.

85. A. FRIGIDUS, Gray. Subglabrous, 1–2° high; stipules ovate-oblong, membranous; leaflets 7–9 pairs, ovate-oblong or elliptic-oblong, green; peduncles equaling the leaves; calyx-teeth short; corolla white; pod oblong, acute at each end, black-hairy or glabrous, the stipe equaling or exceeding the calyx.—From the Rocky Mts. of Colorado to Alaska and the Arctic regions.

§ 20. LONCHOCARPI. Pod membranous, lanceolate-cylindric, straight, exsertly stipitate, glabrous, neither suture intruded; flowers rather large; calyx cylindric; leaflets few or almost none.

86. A. LONCHOCARPUS, T. & G. Ashy-puberulent, glabrate, perennial: stem fistulous, branched, 2° long; stipules distinct, small; leaflets 1–5, filiform-linear, remote, the leaf sometimes reduced to the flattened-filiform rachis; racemes loosely many-flowered; bracts half-shorter than the pedicels; flowers white, pendent; calyx-teeth broad-subulate, one-fourth the length of the tube; pod 1½′ long, very sharply acuminate at each end.—New Mexico.

§ 21. MICROCYSTEI. Pod membranous or chartaceous, small, globose or ovate, inflated, sessile, neither suture intruded. Perennial, diffuse or procumbent, mostly small and slender; flowers small and usually few.

87. A. MICROCYSTIS, Gray. Ashy-pubescent, procumbent, from a woody root; stems slender, much-branched; stipules scarious, connate or the uppermost nearly distinct; leaflets 4-6 pairs, oblong or oblong-lanceolate, obtuse; racemes slender, 5–12-flowered; calyx hairy, the teeth setaceous-subulate, equaling the short-campanulate tube; corolla violet or whitish, the deeply emarginate banner slightly exceeding the wings, twice longer than the incurved keel; pod globose-ovate, 3″ long, thin-membranous, gray-pubescent.—Washington Territory.

88. A. LEPTALEUS, Gray. Nearly glabrous, stems slender, ascending, a span high; stipules long-subulate, subconnate at base; leaflets 7–11 pairs, lance-linear or oblong, often acute; peduncles 2–4-flowered, shorter than the leaves; calyx with short black hairs, the campanulate tube slightly exceeding the subulate teeth, about equaling the pedicel and subulate bract; corolla 4″ long, white, the emarginate banner a third longer than the violet-tipped keel; pod ovate or oval, 4″ long, puberulent, chartaceous, sub-obcompressed (?).—Colorado.

89. A. THURBERI, Gray. Cinereous with minute pubescence; stems suberect, 6–10′ high; stipules distinct, small, scarious; leaflets 6–7 pairs, linear-oblong, retuse, rather thick; racemes short-peduncled, loosely 10–20-flowered; flowers whitish, 3″ long, very short, pedicelled; calyx-teeth subulate, slightly shorter than the tube; pod coriaceous-membranous, globose, 3″ long, glabrous.—Arizona.

90. A. JEJUNUS, S. Watson. Pod gibbous dorsally. See page 73, and Plate XIII.

§ 22. BISULCATI. Pod coriaceous, shortly exsert-stipitate, straight, narrowly oblong, semi-cylindric, the deeply concave ventral surface divided by the salient obtuse suture. Perennial.

91. A. BISULCATUS, Gray. Strigulose-puberulent; stem erect, over 1° high, stout; stipules distinct, free; leaflets oblong, often narrow, the lowest near the stem; flowers violet, in dense spikelike racemes, middle-sized, pendent or spreading, the keel nearly straight; calyx-teeth setaceous, scarcely shorter than the campanulate tube; pod ½′ long.—From Nebraska to the Saskatchewan and Rocky Mts.

§ 23. PECTINATI. Pod thick-cartilaginous with a subfleshy epicarp, subovate or oblong, turgid, sessile, neither suture intruded but both thick and prominent. Perennial, 1° high, stem and leaves rather rigid; leaflets nearly filiform, not jointed to the rachis, persistent; lower stipules connate; flowers nearly 1′ long, keel nearly straight.

92. A. PECTINATUS, Dougl. Ashy-puberulent, glabrate; branches striate, angled; calyx-teeth much shorter than the cylindric tube; flowers white, many in a rather short raceme, the banner elongated; pod ½′ long, pendulous, glabrous, cuspidate, the dorsal suture very thick.—Nebraska to the Saskatchewan.

93. A. NUDUS, S. Watson. Pod erect, larger; flowers few, blue. See page 74.

§ 24. SCYTOCARPI. Pod coriaceous, ovate or oblong, rarely cylindrical, turgid, not sulcate and neither suture intruded.

* Stipe thick, about equaling the cylindrical calyx; flowers 1′ long.

94. A. PREUSSII, Gray. Nearly glabrous; stem erect, over 1° high; stipules ovate, distinct; leaflets 6–8 pairs, rather fleshy, subrounded, ½′ long, sometimes retuse; bracts ovate, small; calyx-teeth subulate, 3–4 times shorter than the tube; corolla apparently purple, the straightish keel a little shorter than the wings, banner elongated; pod oval-oblong, 1′ long, straight, firmly coriaceous, inflated, glabrous, pointed, abruptly contracted at base.—S. Nevada.

* * Pod sessile or scarcely stipitate.

(*a*.) Nearly acaulescent, silvery-silky, large-flowered, perennial.

95. A. CHAMÆLEUCE, Gray. Scapes short, 3–8-flowered; pod ½–1′ long. See page 74.

(*b*.) Low, annual or biennial, canescent; flowers small; stipules distinct.

96. A. TEPHRODES, Gray. Hoary-villous; stems very short; stipules scarious, triangular-ovate; leaflets 7–12 pairs, oblong and oval; leaves scapelike, at length 3′ long and exceeding the leaves, spicately many-flowered; calyx-teeth half-shorter than the campanulate tube; corolla purple; pod pubescent, arcuate-ovate, gibbous dorsally, acute, chartaceous-coriaceous, ½′ long or more.—New Mexico.

97. A. ARIDUS, Gray. Silky-canescent, annual; stems a span high, diffuse-erect, leafy; stipules minute; leaflets 5–6 pairs, oblong, white-silky on both sides; peduncles spicately 5–8-flowered, shorter than the leaf; calyx-teeth shorter than the short-campanulate tube; corolla ochroleucous, 2–2½″ long; pod canescent, gibbous-ovate, ½′ long, thinly coriaceous, (or perhaps membranous,) inflated.—S. California.

(*c*.) Canescent-downy; stem rather stout, 1° high or more; flowers and fruit in very dense oblong or cylindric spikes; stipules scarious, distinct.

98. A. PYCNOSTACHYUS, Gray. *Proc. Amer. Acad.* 6. 527. Leaflets in many pairs, oblong, 3–6″ long, equally downy both sides, obtuse or retuse, mucronate; peduncles equaling the leaves, 2–3′ long; spikes 1′ long in flower, 2′ long in fruit; calyx-teeth subulate, shorter than the short campanulate tube; corolla 4″ long, apparently pale: pod coriaceous, ovate, 4–5″ long, glabrous, turgidly lens-shaped, cuspidate, reflexed, 1–3-seeded, sutures acute.—Salt-marshes, Baulinas Bay, California.

(*d*.) Perennial, pilose-silky, decumbent; flowers 4–5″ long; stipules scarious, connate.

99. A. SONORÆ, Gray. Stems slender, decumbently diffuse or prostrate; leaflets 7–8 pairs, oblong-linear or lanceolate, acute, canescent both sides with close-pressed silky hairs; peduncles exceeding the leaves, spicately 8–12-flowered; calyx-teeth setaceous, equaling the campanulate tube; corolla purple, incurved, the inflexed keel produced into a beak; pod hoary-puberulent, ovate-lunate, ½′ long, acuminate, turgid, chartaceous-coriaceous, the sutures prominent.—Arizona, Sonora.

(*e*.) Glabrous or pubescent, perennial, stems ascending or erect, usually flexuous; stipules mostly distinct; flowers 4″ long, (7–8″ long in *A. Hallii;*) pod often spreading or pendulous, very shortly stipitate or sessile; calyx gray- or dark-pubescent, the teeth shorter than the tube.

100. A. GRACILENTUS, Gray. About 1° high, erect, appressed-pubescent; leaflets oblong-linear, attenuate at base; racemes loose; corolla purplish; pod chartaceous-coriaceous, oblong, about 1′ long, inflated, obtuse at each end, straightish, ashy-pubescent, sessile.—New Mexico.

101. A. FENDLERI, Gray. Glabrous or appressed-puberulent, erect, over 1° high; leaflets oblong or linear-oblong; racemes long-peduncled, loosely purple-flowered; pod oval, inflated, chartaceous-coriaceous, about 1′ long, straight, pointed, minutely puberulent, very shortly stipitate.—New Mexico, Colorado. "Probably passing into *A. flexuosus*."

102. A. HALLII, Gray. Subcinereous-pubescent, glabrate; stems rather stout, 1° high, ascending; stipules subulate; leaflets 9–12 pairs, narrow-oblong, 4–7″ long, subcuneate, retuse; peduncles exceeding the leaves: flowers violet, 20 or more, in a dense head-like raceme; calyx dark-pubescent, broad-campanulate, very gibbous at base, 3″ long, the rather obtuse broad teeth 3–4 times shorter; pod oblong, inflated, 7–10″ long, glabrous, straight, pointed, chartaceous-coriaceous; stipe 1″ long.—Colorado.

103. A. FLEXUOSUS, Dougl. Ashy-puberulent, ascending, 1° high; leaflets oblong- or cuneate-linear, obtuse or retuse; peduncles exceeding the leaves: racemes mostly elongated, loose; calyx hoary-pubescent, teeth 3 times shorter than the tube; corolla white or purplish; pod cylindric, 8–11″ long, 2″ broad, puberulent, thinly coriaceous, pointed, straight or subincurved, stipe very short but evident.—Nebraska to the Saskatchewan and Rocky Mts.

§ 25. PODO-SCLEROCARPI. Pod thick-cartilaginous or coriaceous, exsertly stipitate, compressed or turgid, incurved; sutures not intruded, sometimes thickened and separating from the valves. Perennial, branched, ashy-puberulent; stipules small, distinct.

104. A. SCLEROCARPUS, Gray. Very much branched, nearly canescent; leaflets 6–9-pairs, linear; racemes loose; flowers white; pod hoary-puberulent, very thick, lunate or nearly hamate, 1′ long, turgid, cuspidate, rugulose, the stout stipe 2–3 times longer than the calyx.—Washington Territory.

105. A. SPEIROCARPUS, Gray. Pod linear-lanceolate, flattened, spirally coiled. See page 74.

106. A. CYRTOIDES, Gray. *Proc. Amer. Acad.* 6. 525. Softly pubescent; pod linear, terete, strongly curved or annular. See page 75.

§ 26. HOMALOBI. Pod vetch-shaped, flattened or less compressed, straight, margined by the nerve-like sutures, coriaceous or chartaceous, sometimes stipitate. Perennial, the leaves pinnate with many or few leaflets, or in some species simple.

* Flowers in peduncled racemes or spikes; pod many- (7–20-) ovuled.

(*a.*) Stipules apparently all distinct; pod long-stipitate; calyx-teeth 3–4 times shorter than the tube; caulescent, mostly over 1° high, pinnately leaved with many leaflets.

107. A. COLLINUS, Dougl. Erect or diffuse, with a loose grayish pubescence; leaves linear or oblong-linear, obtuse, attenuate at base; peduncles twice longer than the leaves; flowers reflexed, on suberect pedicels; calyx oblong-campanulate or cylindric, gibbous at base, white-pubescent, the teeth triangular-subulate; corolla nearly white, scarcely twice exceeding the calyx, the banner somewhat longest; pod pubescent, linear-oblong, turgid, attenuate at base, 1′ long with the stipe.—Oregon and Washington Territory.

108. A. FILIPES, Torr. Pod 1′ long, flat, glabrous, reflexed. See page 75.

109. A. STENOPHYLLUS, T. & G. Glabrous, erect; leaflets narrowly linear, 6–8″ long; peduncles twice longer than the leaves; flowers 10–16, in an oblong raceme, spreading, purplish or white, the banner exceeding the keel; calyx campanulate, dark-pubescent, teeth rather broad, very obtuse; ovary glabrous, scarcely equaling the stipe; pod unknown.—Montana, (Wyeth.)

(*b.*) Stipules connate, at least the lower ones; pod more or less stipitate. Caulescent; leaves pinnate, with many leaflets; calyx-teeth half shorter than the tube.

110. A. MULTIFLORUS, Gray. Slender; stipules dark; pod oblong, reflexed, exserted. See page 75.

111. A. BOURGOVII, Gray. Strigulose-pubescent; stems a span high, ascending from a woody caudex; stipules scarious, nearly wholly connate; leaflets 7–8 pairs, oblong or lanceolate, acute; peduncles much exceeding the leaves; racemes short, 5–10-flowered; pedicels about equaling the dark-pubescent oblong-campanulate calyx-tube; calyx-teeth rather stout; corolla violet, 4½–5″ long, the keel with an inflexed somewhat produced apex, equaling the wings, a little shorter than the banner; immature pod ovate-lanceolate, black- or cinereous-pubescent, rounded at base, on a very short included stipe.—Mature fruit unknown. Rocky Mts. of British America, (Bourgeau.)

112. A. PALLISERI, Gray. Sparingly strigulose-pubescent, glabrate; stems about 1° high, ascending from a woody base, branched, slender, rather rigid; upper stipules herbaceous, distinct; leaflets 4–9 pairs, linear or lanceolate, 7–12″ long, 1–1½″ wide, rather rigid, obtusish; peduncles equaling the leaves; raceme loosely 7–12-flowered; peduncles equaling the short-campanulate calyx; calyx-teeth not half as long as the tube; corolla whitish-purple, 4½–5″ long, curved, keel with a narrow inflexed tip and shorter than the wings; pod linear, 8–9″ long, 1″ wide, turgid, glabrous, straight, on a very short but manifest stipe.—Rocky Mts. of British America, (Bourgeau.)

113. A. PORRECTUS, S. Watson. Stout; leaflets broad-obovate; pod oblong, gibbous dorsally, exsert, erect upon the spreading pedicel and stipe. See page 75.

(*c.*) Stipules connate, or at least the lower ones; pod sessile. Caulescent.

(1.) Calyx-teeth very slender, somewhat exceeding the tube. Low, from a woody caudex, pinnately leaved; stipules all more or less connate.

114. A. PAUCIFLORUS, Hook. Dwarf, many-stemmed, cinereous-pubescent, matted-decumbent, with crowded leaves and rather large stipules; leaflets 3–5-pairs, oblong or lanceolate, acute; peduncles about equaling the leaves, 2–5-flowered; flowers approximate, racemose, spreading; corolla violet, 4½–5″ long, the shortly incurved keel very obtuse, shorter than the wing and half as long as the reflexed banner; pod linear-oblong, flattened, silky-puberulent, 4–5″ long.—Rocky Mts. of British America.

115. A. TEGETARIUS, S. Watson. Flowers 2–3″ long; pod 2–3″ long, ovate-oblong, straight. See page 76, and Plate XIII.

116. A. MISER, Dougl. Cinereous-puberulent; stems diffuse, a span long, slender, loosely leaved; stipules rather large, the upper connate to the middle; leaflets broad-linear or oblong, mostly obtuse;

peduncles much exceeding the leaves, loosely 5–12-flowered; corolla and calyx nearly as in *A. pauciflorus*; young pod ovate-oblong, canescent.—Washington Territory.

(2.) Calyx-teeth short or about equaling the tube; upper stipules nearly distinct. Slender, rather rigid, branched, pinnately or by abortion somewhat simply leaved, the petioles sometimes naked; flowers in loose long-peduncled racemes, ochroleucous or purplish, the keel a little shorter than the banner.

**(2a.) Pods linear or linear-oblong, about 1′ long; stems slender.**

117. A. CAMPESTRIS, Gray. Keel with a long inflexed beak; pod oblong-linear, puberulent. See page 76.

118. A. SEROTINUS, Gray. Cinereous-puberulent, glabrate; stems ascending, 9–18′ high; leaflets 4–10 pairs, linear; racemes virgate, 9–20-flowered; calyx-teeth 3–4 times shorter than the tube; corolla purplish, about 4″ long, the inflexed tip of the keel short, somewhat narrow; pod linear, nearly glabrous.—Washington Territory.

119. A. DECUMBENS, Gray. Cinereous- or silky-pubescent; stems diffuse or ascending, 6–10′ high; petioles sometimes somewhat flattened, mostly with 7–13 linear-lanceolate acute leaflets; racemes 5–10-flowered; calyx-teeth attenuate, little shorter than the tube; corolla 4–4½″ long, ochroleucous or purplish, the keel with a short inflexed tip; pod broad-linear, straight or falcate, about 1′ long, hoary-puberulent.—Rocky Mts. of Colorado and northward.

120. A. JUNCEUS, Gray. Petioles frequently naked; flowers distant, the keel strongly incurved. See page 76.

**(2b.) Pod semi-ovate, ½′ long; stems rather stout.**

121. A. PALMERI, Gray. *Proc. Amer. Acad.* 7. 398. Cinereous-puberulent, glabrate; stem over 1c high; stipules very short; leaflets 8–13 pairs, oblong, 6–9″ long; spikes long-peduncled, strict, 4–5′ long, rather loosely many-flowered; bracts subulate, equaling the very short pedicels; calyx-teeth subulate, about equaling the campanulate tube; half-shorter than the purple-blue (3″ long) corolla; pods puberulent, flattened, erect on spreading pedicels, 5–7-seeded, 6″ long.—Resembling *A. porrectus* in habit. S. Arizona.

(*d.*) Stipules scarious, connate; pod short, sessile, few-seeded. Acaulescent, cæspitose, silky-canescent; leaves simple, lanceolate- or spatulate-linear, rarely some of them 3–5-foliolate; scapes exceeding the leaves, many-flowered; corolla purple or rose-color.

122. A. CÆSPITOSUS, Gray. Scapes 2–6′ long; racemes spikelike; calyx-teeth narrowed, about equaling the tube; keel very obtuse, much shorter than the banner; pod oblong or broad-lanceolate, 3–5″ long, scarcely curved; somewhat flattened.—W. Nebraska.

* * Cushioned; flowers scarcely exserted from among the simple leaves; pod many-ovuled, somewhat turgid, margined with rather strong sutures.

123. A. SIMPLICIFOLIUS, Gray. Leaves narrow, acute; flowers few, purple; pod 4″ long, oblong. See page 77, and Plate XII.

* * * Caulescent, often depressed; flowers subsessile in the axils of the leaves; pods 3–4-ovuled, usually 1-seeded, ovate, sessile; leaves pinnate, with few leaflets.

124. A. KENTROPHYTA, Gray. Leaflets linear-subulate, rigid, spinulose; pod 3″ long, ovate, compressed. See page 77.

**(B.) Leaves apparently palmately 3-foliolate.**

§ 27. TRIPHYLLI. Pod conical-ovate, acuminate, not stipitate nor compressed, coriaceous, many-ovuled, somewhat included in the calyx, neither suture intruded. Perennial, cæspitose from a much-branched woody caudex, low, silvery-silky, with crowded leaves; stipules rather large, thinly scarious, connate, imbricate upon the branches; leaves pinnately 3-foliolate, very rarely 5-foliolate, the leaflets crowded.

125. A. TRIPHYLLUS, Pursh. Acaulescent, glossy silky; stipules hyaline, glabrous; primary leaves sometimes 5-foliolate with cuneate oblanceolate leaflets, the rest with 3 longer lanceolate leaflets, long-petioled, exceeding the sessile crowded flowers; calyx-teeth half-shorter than the cylindrical tube; corolla ochroleucous or white, 1′ long; pod villous, included.—Nebraska to the Saskatchewan.

126. A. TRIDACTYLICUS, Gray. *Proc. Amer. Acad.* 6. 527. With the habit and leaves of the last; stipules villous; flowers 5″ long, pale-purple; calyx-teeth equaling the tube; pod globose-ovoid, 3–4″ long, puberulent, 12-ovuled, 3–4-seeded; calyx deciduous, exposing the pod.—Rocky Mts., Colorado.

127. A. SERICOLEUCUS, Gray. Very broadly cæspitose, silky-hoary; stems branched, prostrate, the branches covered with the villous stipules; leaves all 3-foliolate, not equaling the 2–6-flowered filiform peduncles; leaflets 3″ long, oblanceolate or cuneate-oblong; calyx-teeth about equaling the campanulate

tube; corolla purple, 3–4″ long; pod ovate-oblong, 3″ long, hoary, half-included in the calyx.—Upper Nebraska to the Rocky Mts.

Series III. An anomalous species, the keel very sharply acuminate in the manner of *Oxytropis*, the pod with the dorsal suture alone inflexed, as in *Astragalus* proper.

128. A. NOTHOXYS, Gray. Diffuse from an annual root, cinereous-puberulent; stems slender, 3–12′ long; stipules nearly free, distinct; leaflets 6–9 pairs, ovate-oblong or oblong, 3–6″ long, often retuse, glabrate above; peduncles 3–6′ long; raceme short, spikelike; calyx-teeth subulate, shorter than the oblong tube; corolla violet, ½′ long, the broad and short incurved apex of the keel abruptly contracted into a short very acute porrected cusp; pod broad-linear, 8–11″ long, falcate, puberulent, thin-coriaceous, sulcate dorsally and nearly 2-celled, the ventral suture rather prominent.—Arizona.

*Obscure species.*

A. DIAPHANUS, Dougl. *Hook. Fl. Bor.-Amer.* 1. 151. Prostrate and diffuse, pilose-scabrous; stipules small, ovate, acuminate; leaflets 5–9 pairs, obovate; peduncles shorter than the leaves; flowers in loose heads, purple, about 6″ long; bracts minute, ovate, acuminate, rather shorter than the pedicels; pods scarcely 1′ long, linear, much flattened, falcate, somewhat reflexed, nearly glabrous, 2-celled, many-seeded, somewhat diaphanous.—Near the Great Falls of the Columbia, (Douglas.)

A. POLARIS, Benth. *Trans. Linn. Soc.* 23. 323. Glabrous or sparingly pubescent; stems shortly diffuse; stipules connate; leaflets 11–15, ovate or oblong, retuse or emarginate-bifid; peduncles about equaling the leaf, 1–4-flowered; calyx-teeth a little shorter than the tube; corolla about 3 times longer than the calyx, the keel shorter than the wings and banner; pod nearly sessile, erect, broadly linear-oblong, inflated, membranous, 1′ long, 3–4 times exceeding the calyx, black-hairy, rounded at the ends, dorsal suture not intruded.—Resembling *A. alpinus.* Eschscholtz Bay, (Seemann.)

A. GIBBSII, Kell. *Trans. Calif. Acad.* 2. 161, *fig.* 50. Canescently short-villous; stems 1–2° long; stipules slightly adnate, distinct; leaflets 8–10 pairs, obcordate, cuneate, petiolulate, ½′ long, rarely as wide, the lowest approximate to the stem; peduncles exceeding the leaves, 8–10′ long; bracts ovate, acute, equaling the pedicels; flowers 1′ long, 15–20 in a short raceme, spreading, pale-purple; calyx-teeth broad, acute, 4 times shorter than the tubular-campanulate gibbous densely white-pubescent tube; keel with a short incurved obtuse apex, shorter than the subvillous banner and wings; ovary linear-oblong, pubescent, stipitate, 6–7-ovuled, the ventral suture slightly inflexed; stipe half the length of the calyx.—Headwaters of the Carson River, California, (Gibbs.)

PHACA DEBILIS, Nutt. *T. & G., Fl.* 1. 345. Somewhat pubescent, or glabrous below; stems slender, short, decumbent; stipules slightly adnate, acuminate; leaflets 8–11 pairs, about 3″ long, cuneate-oblong, somewhat truncate or emarginate at apex, petiolulate, minutely appressed-hirsute beneath; petioles rather long; peduncles exceeding the leaves; flowers 10–15, in close heads or short spikes, pale-purple, about 5″ long; the banner deeply emarginate; calyx grayish-pubescent, the subulate teeth about equaling the tube.—Pod unknown. "Plains of the Rocky Mts., near streams," (Nuttall.)

PHACA PARVIFOLIA, Nutt. *T. & G., Fl.* 1. 348. Slender, canescent, subcæspitose; stems very short; lower stipules united, upper ones triangular-ensiform; petioles long; leaflets 5–8-pairs, very small, lanceolate-linear, mostly acute; rachis flattened and slightly winged; peduncles slender, exceeding the leaves; flowers 5–7, purple, in a short raceme; calyx-tube short, black-pubescent, a little exceeding the acute teeth; pod pubescent, sessile, terete and somewhat boat-shaped, acute.—Rocky Mts., toward the sources of the Platte, (Nuttall.) Dr. Gray conjectures that this may be a form of *A. oroboides.*

A. VAGINATUS, Pall. *Hook. Fl. Bor.-Amer.* 1. 149. Erect, pubescent; leaflets linear-lanceolate, acute; peduncles longer than the leaves; flowers white and purple, in dense spikes, nodding; pods linear, straight.—Wooded country of subarctic America, (Richardson.) "Referred by Planchon to *Phaca australis.*"—Said to be very similar in habit to *A. aboriginum.*

## OXYTROPIS.

**(A.) Calyx becoming bladdery in fruit.**

§ 1. CALYCOPHYSÆ. Fruiting calyx inflated, globose, including the ovate chartaceous-membranous pod, which is somewhat half-2-celled by the intrusion of the ventral suture. Matted-cæspitose, subacaulescent; scapes 2-flowered.

1. O. MULTICEPS, Nutt. Canescently-silky, 1–3′ high; leaflets 3–4 pairs, about 3″ long; flowers purple, 6″ long; pod short-stipitate.—Rocky Mts. of Colorado and S. Montana.

**(B.) Calyx unchanged.**

§ 2. PHYSOCARPÆ. Pod inflated, membranous, the ventral suture only thickened within or intruded. Acaulescent, the scape umbellately or capitately 2–6-flowered.

2. O. PODOCARPA, Gray. Depressed-cæspitose, the caudex much divided, white-villous, at length becoming glabrous; stipules long-adnate to the petiole; leaflets 5–11 pairs, crowded, linear-lanceolate or oblong-linear, 2–4″ long; peduncles equaling the leaves, 2-flowered; keel of the bluish (?) corolla short-mucronate; pod oblong-ovate, about 1′ long, thin-membranous, subglabrous, very sharply acuminate, on a slender stipe equaling the calyx.—Labrador, Arctic Regions, and in the Rocky Mts. in lat. 49°.

§ 3. CAMPESTRES. Pod coriaceous or chartaceous, not bladdery or but slightly so, sessile or sub-stipitate, septate from the ventral suture to the middle or almost completely, the dorsal suture rarely somewhat intruded. Acaulescent; stipules long-adnate; flowers spicate or capitate, usually many, rarely 2–4; pods erect.

* Leaflets in pairs.

(*a.*) Scapes 2–5-flowered.

3. O. URALENSIS, L., Var. PUMILA, Ledeb. Silky-villous; scapes 1–2′ long; leaflets about 4 pairs, 3″ long; flowers violet-blue, scarcely exceeding the calyx; pod oval-oblong or long-oblong, the ventral septum extending to the dorsal suture.—Arctic shores and islands, and in the Rocky Mountains to Colorado.

(*b.*) Spikes or heads many-flowered.

4. O. CAMPESTRIS, L. Pod chartaceous, ovate or ovate-oblong, somewhat inflated; flowers yellowish, tinged with violet, rarely blue; leaflets in many pairs, oblong-lanceolate, not silky-canescent.—Arctic regions to Labrador, Maine, and in the Rocky Mts. to Colorado. See page 77.

5. O. LAMBERTI, Pursh. Pod coriaceous, sometimes nearly cartilaginous, erect, oblong- or elongated-cylindric, over 1′ long, 2–3″ broad, nearly 2-celled; scapes 6–12′ high; flowers 8–12″ long, spicate, purple, violet, ochroleucous or white; leaflets in many pairs, lanceolate, oblong, or linear, hoary-silky, as also the calyx; stipules mostly very hirsute or woolly.—From the Saskatchewan to Texas and New Mexico, and west to the Rocky Mts. and Washington Territory.

6. O. NANA, Nutt. Cæspitose, much-divided; scapes 2–3′ high; leaves very-crowded, more hoary-silky; leaflets 3–4 pairs; flowers 9–12, capitate, rather large, blue; pod not known.—Rocky Mts. of N. Colorado, (Nuttall,) and Montana.

* * Leaflets mostly somewhat verticillate.

7. O. SPLENDENS, Dougl. Silvery silky-villous, 6–12′ high; leaflets 3–6 together, usually 5–10″ long; flowers erect-spreading, blue; pods ovate, erect.—From Nebraska to Bear River in British America and west into the Rocky Mts.

§ 4. MONTANÆ. Pod thinly coriaceous, oblong or cylindrical-elongated, somewhat half-2-celled by the impression of the ventral suture, shortly stipitate or nearly sessile. Caulescent or subacaulescent, with scapelike peduncles; upper stipules at least adnate, but only at base; leaflets crowded; flowers bright-blue, spicate or capitate, rather small with a short calyx-tube, spreading; pods usually spreading or deflexed.

8. O. DEFLEXA, DC. From the Saskatchewan to the Rocky Mts. and N. Colorado.

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## HORKELIA.

With the following genus *Ivesia*, as arranged by Dr. GRAY in *Proc. Amer. Acad.*, Vol. VI, pp. 528–532, (1866,) but with the addition of several more recent species.

* Leaflets somewhat rounded, or cuneate, dentate and incised.

(*a.*) The accessory calyx-segments equaling the true ones or nearly conformed to them; cymes with subleafy bracts, the alar flowers upon longer pedicels.

1. H. CALIFORNICA, Ch. & Sch. Villous-pubescent or sometimes silky, somewhat viscid above, ½–2° high; stipules incised or mostly entire; calyx-lobes large, triangular-lanceolate, the accessory ones ovate-oblong, or sometimes lanceolate-ovate, occasionally bifid or toothed at the apex; petals oblong or obovate-oblong, shorter than or equaling the calyx.—California.

(*b.*) Accessory lobes much smaller than the true ones.

2. H. PARVIFLORA, Nutt. Tomentose; stem leafy; upper leaflets cuneiform; flowers small, petals spatulate. See page 89.

3. H. CAPITATA, Lindl. Somewhat glabrous, the stem viscid-pubescent toward the top; upper leaf-

lets oblong and attenuate at base; stipules entire or 3-parted; flowers in dense heads, shorter than the laciniate bracts; accessory lobes lanceolate-subulate, shorter than the broadly-cuneiform petals.—Oregon.

4. H. Bolanderi, Gray. *Proc. Amer. Acad.* 7. 338. Low, cæspitose (?) or prostrate from a woody-tufted caudex; leaves villous-hoary with a soft dense pubescence; leaflets palmately 3–5-cleft; stipules narrow-linear, entire; flowering stems 3–5′ long; cymes small, dense; calyx deeply 5-cleft, the accessory lobes oblong, about half-shorter than the broader true ones; petals obovate, scarcely unguiculate; filaments lanceolate.—Clear Lake, California, (Bolander.)

* * Leaflets narrow, lobed or deeply incised, the lobes or segments linear; stipules laciniate or pectinate; accessory calyx-lobes linear or subulate; cymes at length perfect, many-flowered.

5. H. fusca, Lindl. Subviscid-pubescent, 2–3° high; leaves at length glabrate; leaflets cuneate-oblong, incised; accessory lobes linear, much shorter and smaller than the triangular-lanceolate true ones; petals narrowly cuneate, obcordate.—Oregon, (Douglas.)

6. H. congesta, Hook. Villous-bearded, nearly glabrous above, 1–2° high; leaflets narrow; cuneate, incised chiefly at apex; accessory lobes lanceolate, much shorter and smaller than the triangular true ones; petals broadly obovate or rounded, with a narrow claw.—S. Oregon; N. California.

7. H. tenuiloba, Gray. Villous-canescent; leaflets 3–4″ long, cuneate in outline, deeply palmately 4–8-parted, the middle sinus often the deepest, the lobes linear; accessory calyx-segments linear, about equaling the lanceolate true ones; petals 3″ long, narrowly oblong-spatulate, not unguiculate, emarginate; filaments lanceolate.—St. Rosa Creek, California.

## IVESIA.

* Flowers yellow, crowded at the top of the scape; stamens 5–10; leaves mostly radical.

1. I. Gordoni, T. & G. Mostly viscid-pubescent, 3–8′ high; calyx turbinate; stamens 5; receptacle long-villous. See page 90.

2. I. lycopodioides, Gray. Dwarf, 1½–3′ high, nearly glabrous; leaves 1′ long, cæspitose-crowded upon the thick caudex, the quasi-verticillate pinnæ densely crowded, the very small leaflets 5–7-divided, the obovate-rounded segments rather thick, imbricated around the rachis; scape capitately 3–5-flowered; stamens 5, (sometimes 10–15;) receptacle long-villous, (but less so, and calyx more shallow;) carpels 5–10.—Mt. Dana and Bear Mt., California; alpine.

3. I. pygmæa, Gray. With the habit of the last, but minutely glandular; leaflets less crowded, the oblong segments bristle-tipped; bracts and calyx sparingly hirsute; stamens 10; receptacle short-hairy in the shallow calyx; carpels 7–15.—Sierras of California; alpine.

* * Flowers white, with 15–20 stamens; stems slender, more leafy; cymes panicled; leaves white-woolly or glabrous, often terete with the imbricated leaflets; filaments very slender.

4. I. Pickeringii, Torr. White-woolly, 1° high; leaves at first terete, the leaflets at length slightly spreading, 3–5-parted or cut, the segments oblong; pedicels shorter than the calyx, which is obconic-campanulate in fruit; accessory calyx-lobes ovate-lanceolate; stamens 20, in 3 rows; anthers mucronulate; carpels 4–6.—California or Oregon, (Wilkes.)

5. I. Kingii, S. Watson. Resembling the last; glabrous and glaucous, excepting the subpubescent calyx and elongated pedicels. See page 91.

6. I. santolinoides, Gray. *Proc. Amer. Acad.* 6. 531, and 7. 339. A span to 18′ high, white-woolly; leaves terete, the very small 3–5-parted leaflets very closely imbricated upon the rachis, the segments oval, obtuse; cyme at length effuse, very much branched, the branchlets and pedicels (3–6′ long) capillary; calyx-tube cup-shaped, twice longer than its lobes, the accessory segments small, ovate; flowers small, scarcely 3″ broad, the petals orbicular, sessile; stamens 15, one before each true calyx-lobe and two before each petal; filaments capillary, equaling the calyx; anthers didymous, not apiculate; carpel solitary upon the very woolly receptacle, subreniform-globose, utricular, filling the connivent fruiting calyx.—Sierras of California.

* * * Somewhat anomalous and diverse species.

7. I. unguiculata, Gray. *Proc. Amer. Acad.* 7. 339. Loosely villous, about 1° high; leaflets very numerous, 2–3″ long, quasi-verticillate, lax, mostly twice-2-parted, the segments linear; stipules sparingly laciniate or entire; flowers clustered in short-peduncled cymes, the pedicels very short; calyx 3″ long, deeply cleft, the accessory lobes linear, nearly equaling the very acute triangular-lanceolate true ones; petals 2″ long, broad-cuneate with long slender claws; stamens about 15, the filaments filiform-subulate; carpels 5–8; receptacle sparingly villous.—Yosemite Valley.

8. I. tridentata, Gray. *Proc. Amer. Acad.* 7. 338. (*Horkelia*, Torr.) Very softly villous; stems

about 1° high, spreading or erect, slender, naked at top; younger leaves silvery-silky, the older subglabrate; leaflets 5–11, somewhat scattered, oblong-cuneate, mostly 3-toothed at the apex; stipules sparingly laciniate or subentire; cymes peduncled, crowded, the developed pedicel equaling the flower; accessory lobes of the campanulate calyx linear, equaling the tube, shorter than the very acute true ones; petals white, shortly clawed; stamens 10; carpels 5–10; receptacle villous.—Sierras.

9. I. Baileyi, S. Watson. Viscidly-pubescent; leaflets 3–10 pairs, broadly cuneate-ovate, 3–7-toothed or parted; flowers yellow, in an open panicle; stamens 5; carpels 1–5. See page 90.

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## LITHOPHRAGMA.

As revised by Dr. Gray in *Proc. Amer. Acad.*, Vol. VI, p. 533, (1865.) Referred by Bentham & Hooker to *Tellima* as a section, which genus includes the additional species *T. grandiflora*, Dougl.

* Lamina of the petals 3–7-parted, the segments narrow; leaves all parted or the lowest lobed; the root and sometimes the stem bearing bulblets.

1. L. glabra, Nutt. Small, glabrous; raceme and axils of the leaves often bulbiferous; pedicels exceeding the puberulent campanulate calyx; ovary adnate to the calyx only at base; seeds muriculate.—Oregon, N. California, and Colorado.

2. L. tenella, Nutt. Low, glandular-hirsute; petals 2″ long, irregularly 5–7-cleft. See page 95.

3. L. parviflora, Nutt. Larger, scabrous, calyx glandular; petals much exserted, 5-cleft. See page 94.

* * Lamina of the petals dilated, 3-lobed, rarely entire; radical leaves reniform-rounded, somewhat undivided or crenate-lobed, the upper 3–5-cleft or parted; bulblets none; flowers rather large.

4. L. affinis, Gray. Scabrous-roughened, 1–1½° high; flowers moderately pedicelled; tube of the very densely glandular-roughish calyx turbinate, adherent to the ovary nearly to its apex; styles granulose; petals very much dilated, 4–6″ long, 3-lobed at the apex, the middle lobe occasionally laciniate-toothed; seeds smooth.—California.

5. L. heterophylla, Gray. About 1° high; pedicels very short; calyx broad-campanulate, less roughened, in fruit quasi-truncate at base; ovary free; styles glabrous; petals 3-lobed; seeds muriculate.—California.

6. L. Bolanderi, Gray. Larger, 1–2° high, hirsutish-scabrous; leaves often 1–2′ broad; racemes elongated, many-flowered; pedicels very short or half-shorter than the broad-campanulate calyx, which in fruit is abrupt at base; ovary nearly free; petals white, 3–4″ long, usually entire, sometimes slightly 3-lobed or with a tooth on each side; styles very short and glabrous; seeds muriculate-scabrous.—California.

7. L. Cymbalaria, T. & G. Slender, glabrous; stem scape-like, 6–14′ high, 4–7-flowered; leaves 4–8″ broad, the cauline a single pair or nearly obsolete; calyx campanulate, acute at base, shorter than the pedicels; ovary adherent at base; petals 3–4″ long, spatulate or oblong, entire; seeds muriculate-scabrous.—S. California.

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## ANTIRRHINUM.

As arranged by Dr. Gray in *Proc. Amer. Acad.*, Vol. VII, pp. 372–377, (1867.)

§ 1. ORONTIUM, Benth. Annual erect herbs; leaves entire, the lowest opposite; capsule ovoid or globose, unequal; seeds compressed, smooth and carinate on the back, cyathiferous on the inner face.

1. A. cyathiferum, Benth. Leaves petioled, ovate or broad-lanceolate; flowers 4″ long, in nearly all the axils.—Lower California.

2. A. confertiflorum, Benth. Viscid-pubescent, branched at base, rigid, 6′ high; leaves subsessile, linear or lanceolate, the floral ones 1–2′ long, the lower shorter and broader; flowers 7–8″ long, subsessile, crowded in a leafy spike; calyx-segments shorter than the broad corolla-tube; limb of corolla ample; seeds black.—California, (Coulter.) Dr. Gray thinks it probably *Mohavea viscida*.

§ 2. SAEROBHINUM, Gray. Palate prominently protruded, not closing the throat or scarcely; filaments more or less dilated at top; capsule unequal; seeds as in *Antirrhinastrum*. Annual herbs mostly with alternate leaves, strict, or diffuse and bearing filiform often twining branchlets; pedicels short or none; flowers nearly always small. Californian, excepting *A. Kingii*.

* Stems erect, strict, simple or simply branched at base, with axillary flowers from the base to the top, without branchlets; leaves oblong-linear, obtuse, somewhat petioled, similar, mostly exceeding the small nearly sessile flowers; calyx subequal, segments linear; capsule beaked by the rigid subulate style.

3. A. CORNUTUM, Benth. Viscid-villous, subglandulose, about 1° high, branched at base; corolla-tube longer than the calyx and its lips, the sac prominent and scrotiform; filaments all obliquely obovate-dilated above; style a little longer than the capsule; seeds echinulate-favose.—Sacramento Valley, (1888 Hartweg.)

4. A. LEPTALEUM, Gray. Viscid-villous, scarcely at all glandular; stem 1½° high, very simple or sparingly branched at base; corolla apparently white, the tube 2½″ long, scarcely exceeding the calyx, about equaling the lips, upper lip deeply bifid, the nearly equal lobes obovate, slightly erose-crenulate; sac narrow, scrotiform; the longer filaments obliquely obovate-dilated above, the shorter scarcely dilated; style about equaling the capsule; seeds rugose-pitted.

* * Flowers more densely spicate, exceeding the diminished floral leaves; leaves narrow, mostly sessile; stems erect, branched, with twining branchlets in *A. Coulterianum*.

5. A. VIRGA, Gray. Glabrous; stem very simple, strict, over 2° high; cauline leaves very narrowly linear, suberect, the floral ones small, subulate-setaceous, equaling the calyx; racemes spike-like, virgate, densely flowered, about 1′ long; flowers secund, at length horizontal; corolla ½′ long, the cylindric tube twice longer than the lips and the scarcely unequal ovate-lanceolate to subulate calyx-segments, sac mammæform, palate bearded, lobes very short; filaments viscid-hirsute, the longer ones especially with the dilated apex broader than the anthers.—191 Bridges.

6. A. GLANDULOSUM, Lindl. Tall, very viscid throughout with glandular hairs, widely branched; leaves lanceolate, the floral ones little shorter than the flower; racemes spike-like; corolla rose-colored, over 6″ long, the broad tube a little longer than the equal lips and the unequal broad-lanceolate calyx-segments; filaments alike, slightly dilated upward; style long; seeds fimbrillate-pitted.

7. A. COULTERIANUM, Benth. Stem slender, 2–4° high, glabrous, erect or climbing; leaves glabrous, linear or the lower oblong, subpetioled, the floral ones minute; raceme spike-like, crowded, viscid-pilose, usually glandular; corolla-tube a little exceeding the calyx-segments, sac large and mammæform, the lower lip very large, twice longer than the tube, the upper small, very spreading, bifid; filaments dilated upward; style persistent, half shorter than the capsule; seeds pitted.—S. California.

* * * Flowers scattered along the diffuse branches, and usually with filiform sometimes twisted and prehensile branchlets from the same axils; leaflets petioled, mostly exceeding the flowers; calyx unequal, the upper sepal larger.

(*a*.) Peduncles longer than the calyx; filaments gradually dilated upward.

8. A. NUTTALLIANUM, Benth. Viscid-pubescent; leaves ovate or the lowest subcordate, the upper floral ones shorter than the flower; calyx-segments subovate, the upper nearly nerveless, moderately larger than the rest, little shorter than the tube of the violet (4–5″ long) corolla; lips longer than the tube, the upper suberect, emarginate-2-lobed, equaling the palate; seeds longitudinally undulate-costate.—S. California.

(*b*.) Peduncles shorter than the calyx; filaments obliquely spatulate-dilated above; calyx hirsute with long loose hairs.

9. A. BREWERI, Gray. Finely viscid-pubescent; branches very slender; leaves ovate- or oblong-lanceolate, obtusish, the upper retuse, the highest shorter than the flower, (in Var. OVALIFOLIUM oval, retuse, the upper emarginate, on the branches small and rounded:) calyx-segments linear or linear-lanceolate, (or oblong,) the upper slightly broader, sub-1-nerved, a little shorter than the corolla-tube; corolla 5–6″ long, pale-violet, upper lip small, nearly 2-parted, the lobes oblong, divergent; seeds irregularly tuberculate.—N. California.

10. A. VAGANS, Gray. Hirsute with spreading rather rigid sometimes glandular hairs, or glabrate; leaves lanceolate or oblong, sometimes linear or rounded on the branches; calyx-segments very unequal, the upper narrow- or broad-oblong, (sometimes broad-oval,) very obtuse, 3–5-nerved, equaling the corolla-tube, the rest linear; corolla 6–8″ long, purple (?), sac ample, upper lip 2-lobed, equaling the palate; seeds irregularly tuberculate. See page 216, and Plate XXI.

11. A. KINGII, S. Watson. Flowers and fruit half as large; capsule nearly globose, tipped with the short straight style. See page 215, and Plate XXI.

§ 3. MAURANDELLA, Gray. Corolla with the prominent palate scarcely or not at all closing the throat; filaments scarcely dilated upward; capsule nearly equal; seeds nearly as in *Antirrhinastrum*. Herbs, usually climbing by flexuous or tendril-like peduncles or petioles; leaves mostly alternate.

* Annuals, climbing by the elongated peduncles only or erect, pilose at base, otherwise glabrous; leaves entire, with short straight petioles or none.

12. A. STRICTUM, Gray. Stem erect, 1–2° high; leaves lanceolate, 1½–2½′ long, the floral ones linear; peduncles 2′ long, filiform, flexuous, scattered racemose; corolla violet, ½′ long, the palate hairy; capsule ovoid-globose, crustaceous, tipped with the long rigid style, a little exceeding the broad-lanceolate calyx-segments; seeds rugose-muricate.—S. California.

13. A. FILIPES, Gray. Slender, diffuse; leaves lanceolate, or the lowest obovate, repand, attenuate into the petiole; peduncles capillary, very long, cirrhose-twisted; flowers very small, "white;" capsule globose.—Colorado Desert, (Newberry.)

14. A. COOPERI, Gray. Slender, very much branched, climbing, 3–4° high; leaves linear or linear-lanceolate, attenuate into a short petiole; peduncles 2–3′ long, capillary, coiled, the upper racemose along the filiform naked branches; corolla yellow, 6″ long, the ample palate hairy, somewhat closing the throat; capsule globose; seeds muriculate on the ventral side, and with 3–4 thick subcorky ridges on the back.—Ft. Mohave, (Cooper.)

* * Perennial, climbing by prehensile petioles and peduncles; leaves cordate-hastate, angled.

15. A. MAURANDIOIDES, Gray. Texas, Arizona, and Mexico.

§ 4. GAMBELIA, Gray. Corolla tubular, slightly gibbous at base, the rather prominent palate not closing the throat, lips short, the upper erect and bifid, the lower with three spreading lobes; filaments scarcely dilated above; capsule equal. Shrubs or undershrubs of Southern California, erect; leaves opposite or ternate-verticillate, often subalternate, entire, the uppermost reduced; peduncles axillary, rather long.

16. A. SPECIOSUM, Gray. Leaves oval or oblong, 1′ long or less, short-petioled; corolla nearly 1′ long, reddish or scarlet, the narrow tube thrice the length of the lips.—Catalina Island.

17. A. JUNCEUM, Gray. Flowers and leaves smaller, the uppermost reduced to minute scales.

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## PENTSTEMON.

The following synopsis is condensed, with little change, from that of Dr. GRAY in *Proc. Amer. Acad.*, Vol. VI, pp. 56–76, (1862.) Mexican species are omitted.

Sect. I. EUPENTSTEMON, Gray. Anther-cells becoming divaricate or divergent, dehiscent to the base, (scarcely so in *P. baccharifolius*,) more or less united at the summits. §§ 1–6.

§ 1. ERIANTHERA, Benth. Shrubby or suffruticose, much branched; leaves thick-coriaceous, rather small; inflorescence strictly racemose; corolla violet or purple, slightly bilabiate, throat dilated; anthers densely woolly, the cells opening to the top and becoming peltate.—N. W. America.

1. P. MENZIESII, Hook. Very variable; leaves obovate-oblong to long-lanceolate, serrate or entire; calyx-lobes from ovate to narrowly lanceolate-acuminate; sterile filament strongly bearded or almost naked. See page 216.

§ 2. FRUTICOSI, Gray. Shrubby or suffruticose, tall, branched, branchlets often herbaceous; leaves coriaceous, rather small, subpetioled; flowers numerous, panicled, bilabiate, the upper lip more or less arched, the lower deflexed or spreading; anthers glabrous, dehiscent to the top and expanding.—Mostly Californian.

* Corolla short, deeply bilabiate, ringent, yellowish, the lips equaling or a little exceeding the tube; leaves narrowed at base.

2. P. MICROPHYLLUS, Gray. Puberulent; the fascicled leaves 2″ long.—Arizona; little known.

3. P. ANTIRRHINOIDES, Benth. Subcinereous, almost glabrous, much branched, leaves spatulate-lanceolate or oblong, entire; peduncles 2-leaved, usually 1-flowered; sepals round-ovate; corolla yellow, naked, lips ample; sterile filament densely bearded.

4. P. BREVIFLORUS, Benth. Glabrous; leaves serrulate; corolla bearded; sterile filament glabrous. See page 217.

* * Corolla long-cylindric, mostly scarlet, lobes short, the upper erect, subincurved, the lower spreading, 3-parted.

5. P. TERNATUS, Torr. Shrubby, glabrous; leaves linear-lanceolate, verticillate in threes, denticulate; sepals lance-ovate; corolla 1′ long; sterile filament strongly bearded throughout.

6. P. CORYMBOSUS, Benth. Decumbent; leaves oblong, narrow at base, obtuse, subentire, pubescent; cyme corymbose; sepals linear-lanceolate; sterile filament glabrous or sparingly bearded.

7. P. CORDIFOLIUS, Benth. Sarmentose or climbing, pruinose-puberulent or glabrate; leaves ovate and obtuse at base or subcordate, often denticulate or dentate; sepals ovate-lanceolate; corolla over 1′ long; sterile filament densely bearded.

§ 3. AMBIGUI, Gray. Subshrubby; leaves coriaceous; inflorescence panicled; corolla scarlet, dilated above, lips short, the upper suberect, the lower 3-parted, reflexed; anthers glabrous, reniform, cells not dehiscing to the base and not expanding.

8. P. BACCHARIFOLIUS, Hook. W. Texas.

§ 4. ELMIGERA, Reich. Herbaceous, mostly glabrous; leaves entire, the cauline sessile, lanceolate or linear; flowers scarlet, in loose virgate panicles, tubular; anthers glabrous; cells not dehiscent to the apex and not expanding; sterile filament naked.

9. P. BARBATUS, Nutt. Tall; flowers numerous, strongly bilabiate, lower lip deflexed and usually bearded; anther-cells widely divaricate.—Mexico. Var. TORREYI, Gray. Throat of the corolla less bearded or naked, the lips (especially the upper) a little longer.—Colorado to New Mexico.

§ 5. SPECIOSI, Gray. Herbs, glabrous, (except *P. Frémontii*;) leaves entire, the cauline sessile; flowers blue to purple or violet, in a thyrsoid panicle, broad ventricose above, slightly 2-lipped with equally spreading rounded lobes; anthers hairy or glabrous, the divaricate cells not dehiscent to the apex and not expanding.

10. P. GLABER, Pursh. Leaves glaucous, lanceolate or ovate-lanceolate; sepals broad-ovate, blunt or more or less acuminate, the margin submembranous; sterile filament bearded or glabrous. See page 217.

11. P. CYANANTHUS, Hook. Leaves cordate, ovate, acuminate; thyrse short and dense. See page 217.

12. P. STRICTUS, Benth. Subglaucous, virgate and slender; leaves long-linear; panicle narrow with much smaller flowers; sepals short, obtuse; anthers very hairy.—Wyoming; little known.

13. P. FRÉMONTI, T. & G. Pruinose-puberulent; lower leaves spatulate, the cauline sessile, lanceolate; panicle naked, spicate; sepals oblong-ovate, acute, membranous-margined; corolla narrow-funnelform; anthers and sterile filament sparingly bearded. See page 218.

§ 6. GENUINI, Gray. Herbaceous; corolla only moderately or scarcely bilabiate, the lips or lobes usually spreading; anthers glabrous or the valves only ciliate, the cells dehiscent the whole length and usually expanding.

* Glabrous and glaucous, (*P. cæruleus* excepted;) leaves entire, coriaceous, the cauline sessile or clasping; inflorescence thyrsoid, virgate, the peduncles mostly very short, 3–several-flowered; corolla dilated above, scarcely bilabiate, with flat spreading lobes.

(*a*.) Flowers blue, not 1′ long; sterile filament usually dilated above, yellow-bearded.

14. P. CÆRULEUS, Nutt. Very low, usually puberulent above; leaves linear-lanceolate; sepals lanceolate, acuminate, margins commonly ciliolate and membranous. See page 218.

15. P. ACUMINATUS, Dougl. 1½° high or less; cauline leaves lanceolate to subcordate, rigid; thyrse elongated; corolla 6–10″ long; sepals ovate or lanceolate; capsule very sharply acuminate. See page 218.

16. P. SECUNDIFLORUS, Benth. 1° high or less; cauline leaves narrowly lanceolate; cymes more loose and flowers secund.—Rocky Mts. Referred by Dr. Gray to the last species, but now regarded as probably distinct.

(*b*.) Corolla 1½′ long; upper leaves especially rounded and clasping or perfoliate; cymelets 2–5-flowered with no common peduncle; sepals not acuminate; sterile filament with the hooked apex slightly dilated.

17. P. GRANDIFLORUS, Nutt. 3° high; leaves distinct; pedicels short; corolla blue, abruptly inflated; sterile filament scarcely bearded.—Wisconsin to Kansas.

18. P. MURRAYANUS, Hook. 2–3° high; upper and floral leaves connately orbicular; pedicels slender; corolla red, gradually dilated; sterile filament glabrous.—E. Texas; Arkansas.

(*c*.) Corolla about 1′ long, red or scarlet; leaves below oblong, above subovate or lanceolate, clasping; usually tall.

19. P. CENTRANTHIFOLIUS, Benth. Sepals broad-ovate; corolla crimson, tubular, scarcely dilated, with a short equal limb; sterile filament glabrous. See page 219.

20. P. PUNICEUS, Gray. Cymelets rather dense; sepals ovate or oblong; corolla bright scarlet, 1′ long or less, tubular, the throat slightly dilated, lobes broad, rounded, subequal; sterile filament bearded at top.—Arizona and Sonora.

21. P. WRIGHTII, Hook. Panicle loosely virgate, cymelets few-flowered; sepals oblong, the tips spreading; corolla less than 1′ long, bright rose-red, ventricose above, with broad rounded wide-spread lobes; sterile filament densely long-bearded.—W. Texas, Arizona.

* * Glabrous, subglaucous, tall; leaves crowded, oblong or ovate-lanceolate, coriaceous, the upper connate; panicle loose, elongated, cymelets 3–9-flowered and peduncled; corolla 1′ long, blue-purple, inflated above, bilabiate with very broad and spreading lobes; sterile filament glabrous.

22. P. SPECTABILIS, Thurb. W. Texas to California.

* * * Glabrous or nearly so; leaves pinnately parted with narrow-linear segments; panicle loose; corolla purple, not 1′ long, dilated above, lobes subequal; sterile filament bearded at top.

23. P. DISSECTUS, Ell. Georgia.

* * * * Glabrous or pruinose- or viscid-puberulent; leaves filiform-subulate, linear or linear-spatulate, entire; flowers in a simple raceme or loose virgate panicle.

(*a.*) Inflorescence strictly racemose; corolla scarcely bilabiate.

(1.) Leaves almost filiform, glabrous.

24. P. LARICIFOLIUS, H. & A. 6′ high, cæspitose; leaves crowded at base; flowering stems slender, simple; raceme 4–8-flowered; corolla ½′ long, purple, tube dilated above; sterile filament bearded.—S. Idaho.

25. P. AMBIGUUS, Torr. 1–2° high, woody at base, paniculately branched; lower leaves linear, narrowed at base; racemes loose; corolla 5–8″ long, purplish-white, the limb broad and spreading, the tube but little dilated and bearded in the throat; sterile filament glabrous, at times antheriferous.—Colorado to New Mexico and Arizona.

(2.) Leaves linear-lanceolate or linear-spatulate, puberulent or pruinose-pubescent; stems woody at base.

26. P. GAIRDNERI, Hook. Much branched at base, a span high; pedicels short, somewhat opposite; sepals glandular-viscid; corolla ½′ long; sterile filament bearded.—Washington Territory.

27. P. DASYPHYLLUS, Gray. Stem subsimple; raceme loosely few-flowered, the pedicels alternate; corolla purplish-blue, nearly 1½′ long; sterile filament glabrous.—Arizona and New Mexico.

(*b.*) Peduncles mostly 2–5-flowered, forming a racemose or virgate panicle; sepals ovate; stems erect, usually simple.

(1.) Stems 2–3° high; peduncles opposite, elongated, 2–5-flowered, in a rather loose panicle; corolla blue, (or purple,) 1½′ long, dilated above.

28. P. STENOPHYLLUS, Gray. Glabrous; leaves linear, the lower ones 3–4′ long; sterile filament glabrous.—Mexico, Arizona.

(2.) Stems ½–1½° high, usually very minutely pruinose-puberulent; peduncles and pedicels short; corolla purple, short-bilabiate, over ½′ long, much dilated above.

29. P. VIRGATUS, Gray. Very simple at base; leaves 1½–4′ long, linear or linear-lanceolate; peduncles mostly opposite in a very narrow elongated panicle; sterile filament glabrous.—New Mexico.

30. P. LINARIOIDES, Gray. Many-stemmed from a woody base, very leafy; leaves 1′ long or less, spatulate-linear to subulate; peduncles alternate; panicle narrow, subsecund; palate and sterile filament bearded.—New Mexico and Arizona.

(*c.*) Flowers axillary upon the cæspitose-depressed branches, which are leafy to the summit.

31. P. CÆSPITOSUS, Nutt. Flowers secund, 6–9″ long. See page 219.

* * * * * Pruinose- or viscid-pubescent, or with serrate leaves, or with an interrupted panicle of densely-flowered cymelets; inflorescence usually thyrsoid; corolla never red or scarlet.

(*a.*) Sterile filament longitudinally yellow-bearded; corolla campanulate or broad funnelform above, slightly bilabiate.

(1.) Leaves lanceolate, subentire, the upper ones at least and the flowers viscid-pubescent; panicle strict, with short appressed peduncles.

32. P. PUMILUS, Nutt. Dwarf, few-flowered, the cauline leaves a little narrowed at base; corolla somewhat glabrous.—S. Idaho.

33. P. albidus, Nutt. 1° high; leaves often oblong- or ovate-lanceolate; the spicate panicle subverticillately interrupted; sepals lanceolate, very viscid-pubescent; corolla ¾′ long, purplish-white, moderately dilated, the limb beardless; beard of the sterile filament rather short, subinterrupted.—Upper Missouri to W. Texas.

34. P. cristatus, Nutt. Sepals attenuate, very hirsute; corolla 1′ long, violet, broadly dilated, the lower lip and sterile filament long-bearded. See page 219.

35. P. Jamesii, Benth. 4′–1° high, puberulent; leaves linear-lanceolate, often denticulate, rigid; cymelets 3–4-flowered in a spicate panicle; sepals viscid-puberulent; corolla 1′ long or more, pale purple, abruptly campanulate above, the lip and sterile filament less bearded.—Colorado to New Mexico and Texas.

(2.) Leaves broader, usually serrate, the cauline mostly clasping; panicle usually naked, loose-flowered.

36. P. Cobæa, Nutt. 1–2° high, viscid-puberulent; leaves ovate or oblong, sharply serrate or denticulate; the few-flowered panicle and oblong scarcely acute sepals viscid-pubescent; corolla 2′ long, purplish-white, abruptly campanulate above, glabrous within; sterile filament bearded.—Kansas to Texas.

37. P. Palmeri, Gray. 2–5° high, glaucous; leaves ovate or oblong-lanceolate, sharply toothed; panicle glandular-puberulent; sepals ovate, smoothish; corolla 1½′ long, very broad campanulate above; sterile filament densely bearded. See page 220.

38. P. digitalis, Nutt. 3–5° high, usually glabrous except the viscid flowers; leaves 3–6′ long, lanceolate or the upper ovate-lanceolate, serrulate; corolla white, over 1′ long, dilated above the narrow tube, the lobes short; sterile filament sparingly bearded.—Georgia and Florida.

39. P. tubiflorus, Nutt. Slender; corolla tubular-funnelform; filament less bearded.—Arkansas.

(*b.*) Sterile filament longitudinally yellow-bearded, at least along the dilated apex; corolla less dilated, (except *P. glaucus*,) more evidently bilabiate; inflorescence not in crowded clusters.—East of the Sierras.

(1.) Many-flowered; the naked panicle thyrsoid or racemose, the peduncles usually 3–several-flowered; leaves sharply serrulate or subentire, the upper bract-like; upper lip commonly slightly shorter.

40. P. pubescens, Soland. 1–3° high, viscid-pubescent or nearly glabrous; leaves lanceolate; corolla purplish-white, a little dilated above, slightly obcompressed, with two folds under the lower lip, the throat somewhat closed; sterile filament densely long-bearded.—From Canada and the Saskatchewan to Florida and Texas.

41. P. humilis, Nutt. Low and subglabrous; thyrse more strict; corolla deep-blue, ½′ long; throat dilated and without folds. See page 220.

42. P. glaucus, Grah. Glabrous, except the viscid-pubescent inflorescence; corolla 1′ long, ventricose above the base, without folds. See page 221.

43. P. Hallii, Gray. Dwarf; stems numerous; glabrous except the very minutely glandular inflorescence; leaves entire, linear-spatulate or linear; raceme simple, 4–10-flowered, with short pedicels; sepals ovate or oblong with scarious and often erose margins; corolla deep-blue, about 1′ long, ventricose-campanulate above the short base, the lips short; sterile filament short-bearded.—Colorado.

(2.) 2–3-flowered; stems leafy to the summit; peduncles 1-flowered.

44. P. Harbouri, Gray. Dwarf; stems many, pruinose-puberulent; leaves entire, ovate or oblong, obtuse; sepals viscid-pubescent, not scarious; corolla 7–9″ long, purple, the tube slightly dilated, throat and sterile filament bearded.—Colorado.

(*c.*) Sterile filament bearded at the top; corolla bilabiate, the tube scarcely or not at all dilated; panicle interrupted, the cymelets crowded; flowers 5–8″, rarely 9–11″ long.

(1.) Leaves ovate or ovate-lanceolate, usually sharply dentate, the upper subcordate at base, clasping; sepals scarcely scarious on the margins; flowers less crowded.

45. P. ovatus, Dougl. Puberulent; leaves broad; sepals ovate or broad-lanceolate.—Oregon to British Columbia.

46. P. pruinosus, Dougl. Pubescent; leaves cæsious; the often subverticillate inflorescence and lanceolate acuminate sepals viscid-villous.—Oregon.

(2.) Leaves glabrous, usually entire, lanceolate or oblong; sepals scarious, at least on the margins; palate usually bearded; the spike-like thyrse subverticillately interrupted.

47. P. attenuatus, Lindl. 1½–2° high, leaves rarely few-toothed; inflorescence villous or viscid-pubescent; cymes mostly short-peduncled; sepals ovate-lanceolate, narrowly scarious; corolla over ½′ long.—N. Idaho.

48. P. CONFERTUS, Dougl. ½–1½° high, glabrous, strict; flowers densely clustered, the upper cymes nearly sessile; sepals broad-lanceolate or ovate, broad-scarious; corolla narrow, 5–6″ long. See page 221.

(*d.*) Sterile filament (usually) glabrous.

(1.) Leaves serrate; panicle strict; flowers numerous, crowded; corolla slightly bilabiate.

49. P. DEUSTUS, Dougl. Glabrous; leaves often serrate, oblong or lanceolate; corolla yellowish; sterile filament sometimes bearded. See page 221.

50. P. HETERANDER, T. & G. Calyx minutely puberulent; leaves sharply toothed, lanceolate or linear-oblong; cymelets subsessile in a slender interrupted spike-like panicle; sepals lanceolate; corolla whitish; sterile filament sometimes antheriferous.—California Sierras.

(2.) Leaves subentire; pedicels 1–3-flowered, in a small loose panicle; corolla bilabiate.

51. P. WHIPPLEANUS, Gray. 1° high, the slender stem and thin ovate or oblong leaves glabrous; inflorescence viscid-pilose; sepals linear-lanceolate, long-attenuate; corolla 1′ long, much dilated, the lower lip bearded; sterile filament glabrous, dilated and uncinate.—New Mexico.

Sect. II. SACCANTHERA, Benth. Anthers sagittate or horseshoeform, the cells confluent at top and dehiscent to the middle, saccate at base; inflorescence panicled; corolla violet or lilac-color, dilated above, short-bilabiate.—Extreme western species.

* Viscid-pubescent throughout; flowers large; leaves broad, subserrate, the upper ones cordate-clasping.

52. P. GLANDULOSUS, Lindl. Oregon.

* * Puberulent or glabrous; leaves sharply serrate or pinnatifid.

53. P. VENUSTUS, Dougl. Glabrous, erect; leaves rather broadly lanceolate, sharply dentate; the thyrsoid panicle rather loose; corolla 1′ long or more, the lobes ciliate; filaments and anthers sparingly pilose or rarely glabrous.—Oregon.

54. P. DIFFUSUS, Dougl. Puberulent; stems ascending; upper leaves ovate or ovate-lanceolate, subcordate-clasping, thickly serrate; panicle usually leafy, the cymelets crowded; corolla not 1′ long; anthers glabrous; sterile filament bearded at top.—Oregon to British Columbia.

55. P. RICHARDSONII, Dougl. Nearly glabrous, usually with spreading branches; leaves ovate- or narrow-lanceolate, incised or pinnatifid, often alternate on the branches; panicle loose; corolla 1′ long; sterile filament sparingly bearded at the top.—Oregon.

56. P. TRIPHYLLUS, Dougl. Nearly glabrous, branched; leaves lanceolate or linear, few-toothed or pinnatifid, rather rigid, the lower in threes or fours, opposite or alternate above; panicle loose, leafy; corolla ½′ long, slightly dilated; sterile filament densely bearded.—Oregon to British Columbia.

* * * Glabrous or glandular-puberulent; leaves entire; filament flattened at the summit, glabrous or nearly so; peduncles few, slender, 3–6-flowered.

(*a.*) Corolla ½′ long, slightly dilated; anthers glabrous, minutely denticulate on the margin.

57. P. GRACILENTUS, Gray. Leaves attenuate at base, the lower lanceolate, the upper linear. See page 222.

(*b.*) Corolla 1′ long, scarlet, cylindric, slightly dilated; sepals and petals viscid-pubescent.

58. P. BRIDGESII, Gray. *Proc. Amer. Acad.* 7. 379. California.

(*c.*) Corolla 1′ long and more, broad-funnelform above, slightly bilabiate; anthers hirsute at base or glabrous, short-ciliate on the margins.

59. P. HETEROPHYLLUS, Lindl. Glabrous or pruinose-puberulent; leaves narrowed at base; peduncles rarely 2-flowered; corolla reddish-purple. See page 222.

60. P. AZUREUS, Benth. Glabrous, glaucous; leaves lanceolate, the lower spatulate-oblong, the upper sessile and broad at base, often subcordate-ovate; panicle virgate; peduncles 1–3-flowered; corolla bright-blue with a reddish-purple base.—California.

61. P. LÆTUS, Gray. About 1° high, cæsious-pruinose with a short soft glandular pubescence; otherwise resembling the last.—S. California.

62. P. KINGII, S. Watson. Low, pruinose or glandular-pubescent, at least below; leaves oblanceolate with a narrowed base; raceme secund; peduncles 1–4-flowered; corolla 8″ long, purple. See page 222.

*Uncertain species.*

P. TENELLUS, Kell. *Proc. Calif. Acad.* 1. 56.

P. CARINATUS, Kell.; *l. c.*, 1. 62.

P. CANOSOBARBATUM, Kell.; *l. c.*, 2. 15.

P. ROSTRIFLORUM, Kell.; *l. c.*, 2. 15.

# CASTILLEIA.

Chiefly from the revision of the genus by Dr. GRAY in the *Amer. Jour. of Science*, Vol. XXXIII, pp. 335–339, (1862.) Mexican species omitted.

§ 1. HEMICHROMA or EUCASTILLEIA. Calyx (often incurved) deeply cleft anteriorly, slightly bifid behind, usually 4-toothed. (Root perennial.)

1. C. LINARIÆFOLIA, Benth. Leaves long, linear; calyx-teeth subulate; galea elongated, much exserted; usually glabrous. See page 228.

2. C. LAXA, Gray. Cinereous-pubescent; stems subdiffuse, branched; leaves thin, linear-lanceolate, 2′ long, 3″ wide, entire, not dilated at base; the floral shorter than the calyx, red above; flowers few, crowded, short-pedicelled; calyx very thin, colored, 1′ long, teeth short and obtuse; galea broad, slightly falcate, 6–8″ longer than the calyx, lobes of the lip very short, obtuse.—Arizona, (1490 Wright.)

§ 2. EUCHROMA. Calyx cleft both before and behind, the segments entire, emarginate or bifid.

* Root annual or biennial.

(*a.*) Leaves entire.

3. C. AFFINIS, H. & A. Flowers more or less pedicelled; calyx-segments narrow; galea elongated. See page 228.

4. C. INDIVISA, Eng. Pilose-hispid; cauline leaves linear-lanceolate, mostly rounded at base, the floral ones obovate-dilated, rarely somewhat lobed; flowers sessile; calyx-segments broad, usually emarginate; galea short and shortly exserted.—W. Texas.

(*b.*) Leaves laciniately cleft.

5. C. COCCINEA, Spreng. From N. England, Canada and the Saskatchewan to the upper districts of the Southern States and Texas.

* * Root perennial.

(*a.*) Floral leaves more or less dilated above and colored.

(1.) Villous-pubescent, or glabrous below, the pubescence toward the top of the stem spreading-pilose or hirsute, more usually viscid.

6. C. PARVIFLORA, Bong. Usually low, pilose or hirsute: leaves mostly trifid or pinnately laciniate, the floral ones red or yellowish. See page 229.

7. C. PALLIDA, Kth. Taller, often glabrous or glabrate below; leaves linear to ovate-lanceolate, mostly entire; floral leaves whitish or red. See page 229.

8. C. LATIFOLIA, H. & A. Viscid-hirsute throughout, loosely branched; leaves short, obovate, very obtuse, mostly entire, the floral ones dilated at the apex, 3–5-lobed, red; calyx-segments broad, 2-lobed or emarginate; corolla small.—California.

(2.) Tomentose, or with the pubescence upon the stem soft and entangled; cauline leaves linear, entire or trifid.

(2ᵃ.) Hoary; calyx-segments dilated, subentire.

9. C. FOLIOLOSA, H. & A. Floccose-tomentose, the hairs very much branched; stems suffruticose, with the older leaves sometimes becoming glabrous; galea slightly exserted beyond the spatulate-oblong and usually retuse calyx-segments.—California.

10. C. LANATA, Gray. Herbaceous; white-woolly with an appressed webby tomentum; flowers nearly as in the last but larger.—W. Texas, New Mexico and Northern Mexico.

(2ᵇ.) Cinereous-puberulent or subtomentose; calyx-segments most usually bifid; galea exserted; leaves sometimes glabrous above.

11. C. INTEGRA, Gray. Stem loosely tomentose; leaves (usually slightly tomentose) all entire, or the floral ones somewhat lobed, rarely trifid; flowers 1½′ long, the galea larger (6–8″ long) and the lip shorter than in the next; calyx 8–12″ long, the lobes lanceolate.—Colorado to N. Texas, New Mexico and Arizona.

12. C. PURPUREA, Don. Stem a little tomentose or cinereous; leaves puberulent or glabrate, the upper ones usually entire and the floral ones trifid or laciniate; flowers 1′ long, the lip 2–2½″ long, not half the length of the galea.—Arkansas, Texas, and E. New Mexico.

13. C. FLAVA, S. Watson. Villous-pubescent, puberulent above; leaves woolly pubescent, the floral ones deeply 3-cleft, yellow; galea 4″ long, exserted; lip very short. See page 230.

(*b.*) Leaves mostly 3–5-cleft with linear lobes, the floral ones not dilated nor colored; calyx equally cleft or more deeply cleft in front, the segments deeply bifid; corolla-lip more trisaccate-carinate than in the preceding, the lobes half as long as the galea; low, subvillous or subcinereous.

14. C. SESSILIFLORA, Pursh. Calyx and corolla with a narrow elongated tube; lip 3-parted, the lobes linear-lanceolate; corolla 2′ long, galea 4–6″ in length.—Wisconsin and Illinois, west to the plains and south to Louisiana, New Mexico, and Chihuahua.

15. C. BREVIFLORA, Gray. A span high; spikes dense, scarcely 1′ long in flower; calyx ovoid-oblong, lobes lanceolate; tube of the yellow corolla nearly included, the lower lip more 3-saccate, shortly 3-cleft, the lobes oblong, obtuse.—Rocky Mountains of Colorado, alpine.

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## ORTHOCARPUS.

Based upon an examination of the specimens in the Herbariums of Dr. Gray, Dr. Torrey, and Prof. Eaton, and a large recent collection made in California by Messrs. Kellogg and Haniford.

§ 1. TRIPHYSARIA, Benth. Lip of the corolla 3-saccate, the teeth or appendages shorter than the sacs.

* Anthers 1-celled.

1. O. PUSILLUS, Benth. 2–10′ high, slender, much branched, more or less hirsute; leaves setaceously multifid, mostly ½′ long, or less; spike interrupted; bracts exceeding the flowers, linear-lobed; calyx-teeth linear, exceeding the tube, about equaling the (2½″ long) yellowish glabrous corolla; sacs very small and teeth nearly obsolete, galea uncinate; the lower anthers smaller, abortive; capsule subglobose, 2″ or less in length.—About San Francisco Bay; Oregon, (Wilkes.)

2. O. FLORIBUNDUS, Benth. 3–15′ high, stouter, subglabrous, branched; leaves 1–2′ long, linear-lanceolate, setaceously multifid at the apex; spikes dense; bracts shorter than the flowers, lobes linear, entire; calyx 3″ long, teeth broad, acute, shorter than the tube; corolla yellow, glabrous, 5–6″ long, the sacs 1½–2″ broad, galea straight, obtusish; stamens exserted, often nearly equal; capsule 2″ long, oblong.—About San Francisco Bay.

3. O. ERIANTHUS, Benth. 2–10′ high, usually corymbosely much branched, puberulent; leaves as in the last, 1–3′ long; spikes rather loose; lobes of the bracts linear-laciniate, often entire; calyx 3–4″ long, often purplish, the ovate or lanceolate teeth shorter than the tube; corolla 8–12″ long, white, pink or yellowish, tube pubescent, sacs 2½″ in diameter, glabrous with the folds often bearded within, the galea purple, subulate, straight, rigidly erect; capsule ovate, 3–4″ long.—California, from San Diego to Sacramento River.

4. O. FAUCIBARBATUS, Gray. *Pac. R. R. Surv.* 4. 121. Resembling the last, but rather stouter and glabrous, 6–16′ high and branching unequally along the stem; leaves usually broader; corolla more usually yellow or yellowish, the sacs rather smaller, puberulent with the folds always bearded, the galea less purple.—California, from San Francisco to the Klamath River.

* * Anthers 2-celled.

5. O. LACERUS, Benth. *Plant. Hartw.* 329. 6–10′ high, branched, hirsute-pubescent or below glabrate; leaves 1–2′ long, linear or narrow-lanceolate, linear-lobed; spikes short, dense; bracts with entire linear lobes; calyx 4″ long, the linear or lanceolate lobes equaling the tube; corolla rose-colored, 8–10″ long, nearly as in *O. erianthus* but the tube subglabrous and the lip puberulent.—California, from San Luis Obispo to the Sacramento Valley.

6. O. CAMPESTRIS, Benth. *Plant. Hartw.* 329. 2–4′ high, simple or somewhat branched; leaves 1′ long, mostly entire; spikes few-flowered; calyx pilose with spreading white hairs; lower anther-cell minute; otherwise as in the last of which it is probably only a depauperate form.—Collected in the lower Sacramento Valley by Frémont, Hartweg, and Rich.

7. O. GRACILIS, Benth. Subpubescent; stems very slender. 4–8′ high, simple or branched; leaves linear, lobed at the apex, ½–1′ long; spike interrupted below; bracts small, scarcely equaling the calyx; calyx 3″ long, purplish, the lanceolate teeth shorter than the tube; corolla 5–6″ long, purplish, pubescent, the straight subulate galea nearly twice longer than the lip, the teeth erect and lanceolate; capsule 2″ long, oblong.—Collected in California by Douglas. Specimens from Kellogg and Haniford, probably the same, are more pilose, the corolla yellow, and the calyx green with narrow teeth.

8. O. LITHOSPERMOIDES, Benth. Stout and strict, 4′–2° high, hirsute-pubescent throughout, simple or branched; leaves 1–2′ long, lanceolate or ovate, 3-nerved, coarsely lobed at the apex or the lower entire; spike dense, 1–8′ long, the broad palmately lobed bracts equaling the corolla-tube; calyx 6″ long, the linear-lanceolate teeth nearly as long as the tube; corolla 8–12″ long, yellow, puberulent, the

galea straight, acute, 3–4″ long, but little exceeding the broad lip with its short acute teeth; capsule 3–4″ long, ovate-oblong.—Middle California; frequent. 421 Fremont has purple flowers.

§ 2. ORTHOCARPUS, Benth. Lip concave with three folds or shallow sacs, the teeth very short; anthers 2-celled.

* Bracts 5-lobed.

9. O. HISPIDUS, Benth. Leaves linear- to ovate-lanceolate and few-lobed, or linear and entire; bracts pubescent, dilated, coarsely and acutely lobed; corolla 5–9″ long, yellow, puberulent or glabrous, the galea subulate, very acute, straight, lip somewhat saccate. See page 230.

10. O. TENUIFOLIUS, Benth. Pilose-pubescent; stems 4–12′ high, slender, simple or branched above; leaves linear, deeply 3–5-lobed; spike short and dense, 1–2′ long; bracts broad, subglabrous, hispid on the margins, the middle lobe broad and rounded at the apex; calyx 2″ long, the lanceolate teeth equaling the tube; corolla purplish, 6–7″ long, puberulent, the galea uncinate and longer than the slightly dilated 3-plicate lip; capsule 2½″ long, oblong.—Oregon and Washington Territory; Montana.

* * Bracts 3-lobed.

11. O. TOLMIEI, H. & A. Puberulent, 4–18′ high; branches spreading; leaves narrow, mostly entire; spikes short; corolla yellow, glabrous, 4–6″ long, the galea uncinate; capsule retuse, few-seeded. See page 230.

12. O. LUTEUS, Nutt. Resembling the last; hispid; branches erect; spikes elongated; bracts often entire; corolla pubescent; capsule many-seeded. See page 231.

13. O. PURPUREO-ALBUS, Gray, Ms. in Herb. Erect, 4–12′ high, strict, slender, simple or sparingly branched; pubescence short and viscid; leaves linear, ½–1′ long, deeply 3-lobed; bracts similar, slightly dilated at base; spike elongated, interrupted; calyx 3–4″ long, the tube twice longer than the ovate-lanceolate teeth; corolla 8–12″ long, light-purple, pubescent, the galea uncinate, 3″ long, a little exceeding the dilated 3-plicate lip; capsule 3–4″ long, many-seeded.—Collected in New Mexico by Woodhouse, Newberry, and Parry.

14. O. BRACTEOSUS, Benth. Pubescent; stem 6–18′ high, rather slender, strict, simple or branched; leaves 1–2′ long, linear or narrowly lanceolate, 3-lobed; spike dense, 1–3′ long, the broad bracts with triangular acute lobes, subhispid on the margin; calyx 2–3″ long, the tube twice exceeding the teeth; corolla light-purple, 6–8″ long, minutely puberulent, the galea rather short, but little exceeding the dilated 3-plicate lip, uncinate; capsule 2½–3″ long, broad, flattened, very obtuse, about 15-seeded.—S. Oregon to Fraser's River.

15. O. IMBRICATUS, Torr., Ms. in Herb. Stem slender, erect, simple, 8–10′ high, minutely pubescent; leaves 1′ long, linear, entire; spike very short and few-flowered; bracts nearly glabrous, broad and rounded at the apex, the lateral lobes narrow, acute; calyx 2″ long, 2-cleft below the middle, the segments acutely 2-toothed, ciliate; corolla purplish, 4–5″ long, nearly glabrous, the uncinate galea a little exceeding the slightly dilated 3-plicate lip.—Collected by Dr. Newberry on Williamson's expedition in the Cascade Mts., Oregon.

§ 3. ONCHORRHYNCHUS, Benth. Lip of the corolla slightly 3-saccate or 3-plicate, the teeth erect and prominent.—The species more variable; bracts often colored.

16. O. ATTENUATUS, Gray. *Pac. R. R. Surv.* 4. 121. Pubescent; stem 4–8′ high, simple, strict, slender; leaves ½–2′ long, linear, sparingly lobed or entire; spike rather dense above, 1–4′ long; bracts deeply 3-lobed, lobes long and attenuated, equaling the flowers; calyx 4–6″ long, the linear teeth shorter than the tube; corolla 5–7″ long, white or yellowish, subpubescent, the galea straight, acute, a little exceeding the oblong teeth of the slightly dilated purplish lip; capsule 3–4″ long, oblong.—From the Sacramento River to Washington Territory.

17. O. PURPURASCENS, Benth. Pilose-hispid; 4–18′ high, branching, rather stout; leaves 1–3′ long, linear or lanceolate, setaceously multifid; spikes dense, 1–6′ long; bracts colored, 5–9-lobed, the segments usually dilated and short-lobed at the apex; calyx colored, much more deeply cleft anteriorly, the segments more or less deeply 2-cleft; corolla purple, 7–12″ long, pubescent, the galea abruptly attenuate and uncinate at the apex, pilose-crested; the teeth rather short and obtuse; capsule 5–6″ long.—Frequent throughout California.

Var. LATIFOLIUS. Low and very diffusely branched; the lobes of the broad multifid leaves dilated and obtuse; calyx-lobes short.—A remarkable form occurring in salt marshes near San Francisco (6538, Bolander) and in Humboldt County, California.

18. O. DENSIFLORUS, Benth. Pubescent, 4–12′ high, branching, often corymbosely from toward the base; leaves 3-nerved, linear to ovate-lanceolate, sparingly lobed, 2–4′ long; spikes dense, 1–4′ long; bracts 5-lobed, the linear segments scarcely dilated at the apex, colored; calyx 8″ long, the linear teeth not or but little exceeding the tube; corolla 7–15″ long, pubescent, more or less purple or yellow, the galea straight, obtuse or toothed, but little exceeding the purple lanceolate acute teeth of the lip; capsule 4–6″ long.—Frequent throughout California.

19. O. LINEARILOBUS, Benth. *Plant. Hartw.* 330. Pilose-hispid, erect, strict, 12–15′ high, somewhat branched above; leaves 1–3′ long, linear, the lower entire, the upper deeply 3 5-lobed; spike short, dense; bracts palmately 5-cleft with linear lobes exceeding the flowers; calyx-lobes linear, much exceeding the tube, nearly equaling the corolla; corolla 10′′ long, pubescent, purplish, the galea straight, but little exceeding the lip.—Collected only by Hartweg (1903) in the mountains of California. The single specimen in Herb. Gray. scarcely differs from *O. densiflorus* except in its greater hispidness.

20. O. CASTILLEIOIDES, Benth. 4–8′ high, diffusely branched, pilose-hispid above; leaves 1–2′ long, lanceolate, oblong or ovate, the upper usually coarsely short-lobed; bracts broadly dilated, the rounded apex shortly 3–5-cleft; calyx and corolla as in *O. densiflorus* into which it seems to run and of which it may be a form corresponding to the variety of *O. purpurascens.*—From San Francisco to Washington Territory.

21. O. AUSTRALIS, Benth. Chili and Peru.

22. O. PALLESCENS, Gray. *Amer. Jour. Sci.* 34. 339. *Proc. Amer. Acad.* 7. 384. Perennial, hirsute-pubescent; stems ascending, simple or branched, 4–10′ high; leaves 1–2′ long, linear, divaricately few-lobed or entire; spike usually crowded, 1–3′ long; bracts colored, dilated, 3–5-lobed, the middle lobe broad and rounded at the apex or variously cleft; calyx 8′′ long, bifid to the middle, with the segments more or less 2-cleft; corolla 8′′ long, pubescent, the galea obscurely 3-lobed with the middle lobe longer and acutish, a little exceeding the obtuse oblong teeth of the slightly dilated 3-plicate lip; capsule 3-4′′ long.—California and Oregon. Nuttall's original specimens and Lyall's from the Columbia have the calyx-segments shortly 2-toothed and the galea considerably longer than the lip; other mountain specimens of Geyer, Brewer, Cronkhite and Torrey have a shorter galea and the calyx more deeply cleft, and still others from Kellogg have the calyx equally 4-cleft.

23. O. PILOSUS, S. Watson. Perennial (?), pilose-pubescent; leaves lanceolate, few-lobed; bracts colored, broad, 3-lobed, the middle lobe dilated and rounded; calyx 4-lobed to the middle, cleft anteriorly nearly to the base; corolla yellowish, galea straight, acute, exceeding the prominent teeth. See page 231.

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## CORDYLANTHUS.

From the Revision of the Genus by Dr. GRAY in *Proc. Amer. Acad.*, Vol. VII, pp. 381–384, (1867,) with a slight modification of the characters of the second section.

§ 1. ADENOSTEGIA. Inflorescence compound, the flowers often on short pedicels, with 2–4-bractlets; calyx of two leaves, the lower exterior in æstivation; floral leaves and bracts (except in *C. laxiflorus*) very often truncate, retuse, or subtridentate at the apex and more or less callous-tipped.

* Lower sepal about 5-nerved, the upper subscarious, 2-nerved and bifid; stamens 2, with nearly glabrous filaments and 1-celled anthers; floral leaves trifid or subpinnatifid.

1. C. CAPITATUS, Nutt. Heads rather few-flowered. See page 231.

* * Sepals 5–6-nerved, the upper one entire or emarginate; stamens 4, with villous-filaments and 2-celled anthers; leaves narrow-linear or filiform.

(*a*.) Upper and floral leaves 3–5-cleft and with the branches minutely scabrous or subglandular-puberulent.

2. C. FILIFOLIUS, Nutt. Lower leaves entire, the floral ones sparingly hispid, especially on the margins, subcuneate at base, more or less dilated at the extremities; flowers in crowded heads; sepals oblong, obtuse.—Middle and Southern California.

3. C. RAMOSUS, Nutt. Leaves all divided, the filiform segments not dilated; floral leaves with 5–7 nearly equal lobes, scarcely thickened above; corolla yellow, slightly exceeding the ovate or oblong obtuse calyx-leaves. See page 232.

4. C. WRIGHTII, Gray. Leaves 3–5-parted, filiform, the floral similar and not hispid; heads few-flowered, terminal; sepals lanceolate, the upper one 2–3-toothed; corolla 1′ long, purplish.—California, Arizona, and New Mexico.

(*b*.) Leaves nearly always all entire; flowers subpanicled.

5. C. PILOSUS, Gray. 2–4° high, more or less hoary with soft spreading subviscid hairs; leaves linear, the upper usually truncate-emarginate or broadly 3-lobed at the apex; flowers crowded or rather loose; sepals lanceolate-oblong.—Middle California.

6. C. TENUIS, Gray. 2° high, very finely puberulent and nearly glabrous, effusely panicled, with slender branchlets, subfiliform leaves and scattered flowers. See page 232.

* * * Sepals 6-nerved, the upper one emarginate-bifid; corolla rather deeply bilibiate, the lower lip half shorter than the galea; stamens 4, the lower anther-cell either abortive or wholly wanting; filaments slightly villous; leaves all short, linear, usually entire.

7. C. LAXIFLORUS, Gray. Paniculately branched, very hirsute; flowers solitary or approximate. See page 232.

§ 2. HEMISTEGIA. Flowers without bractlets, in a simple or sometimes branched spike, each sessile in the axil of a clasping bract; calyx of a single 2-toothed leaflet, the lower leaflet wanting. Not glandular, somewhat viscid, a span to a foot high.

* Filaments glabrous; base only of the anther-cells ciliolate or bearded.

(*a.*) Lower leaves and the bracts all entire; stamens 4, the longer with 2-celled anthers, the shorter with a small lower cell only; seeds short-beaked, testa smooth (?).

C. MARITIMUS, Nutt. Subpubescent, leaves linear or linear-lanceolate, glabrate, mostly obtuse, spreading; spike short, simple; filaments very unequal.—Coast of California.

C. CANESCENS, Gray. Pubescent, erect; leaves lance-linear, acute, suberect; bracts lanceolate; flowers few, purplish. See page 233.

(*b.*) Cauline leaves entire, the bracts broader and often incised; stamens 2; seeds obtuse, the testa pitted-reticulate.

C. MOLLIS, Gray. Loosely subhirsute-villous; stem and branches diffuse; leaves linear, short; bracts oblong, 2–3-toothed or entire, a little shorter than the yellowish corolla; spikes sometimes branched.—Mare Island, Bay of San Francisco, (Wright.)

* * Filaments villous; stamens 4, with 2-celled anthers, the cells bearded both at base and apex; leaves 3-cleft; bracts 3–5-cleft.

C. KINGII, S. Watson. Erect, branched, viscid and villous-pubescent; leaf-segments linear; corolla purplish, villous. See page 233, and Plate XXII.

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## NAMA.

From Dr. GRAY'S revisions of the genus, *Proc. Amer. Acad.*, Vol. V, p. 337, and Vol. VIII, p. 283.

§ 1. Leaves decurrent and winging the stem, obovate or spatulate; villous with a soft pubescence or pilose; branches procumbent.

1. N. JAMAICENSIS, L. Peduncles very short; seeds costate-pitted.—Key West; Texas; Mexico.
2. N. BIFLORA, Chois. Peduncles filiform; seeds alveolate.—E. Mexico.

§ 2. Cauline leaves all or mostly sessile and subamplexicaul, not decurrent; pubescence soft but not hoary; annual.

3. N. UNDULATA, HBK. Erect; leaves often undulate, all alternate, linear- or spatulate- oblong, the lower oblanceolate-spatulate with the base attenuate; peduncles mostly very short; the mature capsule nearly 1″ long, about equaling the calyx; seeds alveolate-reticulated.—Texas and New Mexico to Chili.
4. N. BERLANDIERI, Gray. Leaves oval-oblong; capsule a half shorter than the calyx; seeds indistinctly pitted.—E. Mexico.

§ 3. Leaves all attenuate at base or petioled.

* Annual, rough with stiff or somewhat rigid hairs, not hoary; leaves attenuate to a rather slender base but scarcely petioled; sepals narrowly and exactly linear.

5. N. HISPIDA, Gray. Flowers often in pairs; capsule oblong; seeds 24–40 in each cell, $\frac{1}{5}$–$\frac{1}{4}$″ long, oblong, very obscurely ridged.—From W. Texas and New Mexico to S. California.
6. N. DEMISSA, Gray. Capsule short-oblong; seeds 10–12 in each cell, $\frac{1}{4}$–$\frac{1}{3}$″ long, oval, less obscurely rugose-pitted. See page 259.

* * Annual; pubescence softer or shorter and a little cinereous; sepals more or less dilated upward.

7. N. SANDWICENSIS, Gray. Sandwich Islands.
8. N. COULTERI, Gray. Pubescence rather roughish; leaves oblong-spatulate, the lowest only attenuate into a petiole; corolla twice longer than the calyx, 5″ long; capsule oblong; seeds broad oval, $\frac{1}{4}$′ long or less, smoothish.—S. California or Arizona; Chihuahua.

9. N. DICHOTOMA, Ruiz & Pav. Pubescence more or less viscid; corolla scarcely exceeding the calyx; capsule rather short-oblong; seeds $\frac{1}{8}$–$\frac{1}{2}''$ long, oval-oblong, coarsely pitted.—Mexico to Bolivia. Var. ANGUSTIFOLIA, Gray. Leaves linear-lanceolate.—New Mexico and S. Colorado.

10. N. LATIFOLIA, Gray. Leaves all slender-petioled; seeds nearly smooth.—S. W. Mexico.

* * * Perennial or perhaps annual, with a somewhat woody base, and a very soft pubescence; leaves not exceeding $\frac{1}{2}'$ in length; seeds very small. Mexican.

11. N. RUPICOLA, Bonpl., and 12. N. ORIGANIFOLIA, HBK.

* * * * Perennial, somewhat shrubby at base; pubescence hispid or silky-canescent; leaves and flowers larger.

13. N. HIRSUTA, Mart. & Gal. S. W. Mexico.

14. N. SERICEA, Willd. Mexico.

15. N. LOBBII, Gray. Pubescent with a webby wool; leaves lanceolate, attenuate to a scarcely petioled base; flowers crowded in sessile axillary and terminal clusters; sepals narrow, not dilated upward.—Sierras of California.

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## MERTENSIA.

Revised by Dr. GRAY in *Amer. Jour. of Science*, Vol. XXXIII, p. 339, (1862.)

§ 1. Filaments slender, much longer than the anthers; corolla-tube several times longer than the deeply 5-cleft calyx, the limb very slightly lobed, the throat without folds.

1. M. VIRGINICA, DC. From W. New York to Wisconsin and Iowa and southward to S. Carolina and Tennessee. Arctic coast, (*M. Drummondii*, Don.)

§ 2. Filaments more or less narrower and longer than the anthers; limb of the corolla lobed.

2. M. MARITIMA, Don. Corolla-tube shorter than the limb, about equaling the sub-5-parted calyx, the folds conspicuous.—From Greenland to Behring Strait and southward on the coast to Cape Cod and Washington Territory. N. Europe and Asia; Japan.

§ 3. Filaments more dilated, as broad as the anthers or broader, and more or less shorter; corolla-limb 5-cleft.

* Calyx not cleft below the middle.

3 M. FENDLERI, Gray. Stem and lower side of the leaves smooth, the upper surface and the pedicels finely appressed hispid; cauline leaves oblong-lanceolate; racemes few-flowered; corolla-tube scarcely longer than the limb and the broad-lanceolate lobes of the hirsute calyx, with a hairy ring on the inside above the base; disk more or less 2-lobed.—New Mexico, (Fendler.)

* * Calyx 5-parted or sometimes deeply 5-cleft.

(*a.*) Corolla-tube 2–3 times longer than the upper dilated portion, (the limb.)

4. M. OBLONGIFOLIA, DC. Low; cauline leaves oblong or spatulate-lanceolate, mostly obtuse; calyx-segments lanceolate or linear, acute, 2–3 times shorter than the corolla-tube, which is naked within. See page 238.

(*b.*) Corolla-tube not more than a half longer than the limb.

(1.) Tall, 1–3° high; cauline leaves ovate or ovate-lanceolate, very sharply acuminate or acute, costate-veined; corolla $\frac{1}{2}'$ long or a little more.

5. M. PANICULATA, Don. Hirsute, roughish or glabrate; calyx-segments lanceolate or lanceolate-linear, acute, hirsute or hispid-ciliate, slightly or a half shorter than the corolla-tube, which is sparingly hairy within. See page 239.

6. M. SIBIRICA, Don. Glaucescent, subpubescent or glabrous; calyx-segments oblong or oblong-linear, ciliolate, 2–4 times shorter than the corolla-tube, which is sparingly hairy or nearly glabrous within.—These species are probably not distinct. See page 239.

(2.) Low; cauline leaves obtuse or acutish, scarcely veined; corolla 3–4'' long.

7. M. ALPINA, Don. A span to nearly 1° high, glabrous or hirsute; leaves spatulate-oblong, lanceolate or the uppermost oblong-ovate, rather small and mostly acute, calyx-segments ovate- or oblong-lanceolate and obtusish, or linear-lanceolate and acute, ciliate, a little shorter than the corolla-tube, which equals the limb and is usually hairy within; anthers inserted in the throat.—Rocky Mountains of Colorado.

8. M. BREVISTYLA, S. Watson. More hirsute; leaves obtuse, corolla-tube usually shorter than the limb, naked within; anthers wholly included in the tube; style very short.—See page 239.

## POLEMONIACEÆ.

Drawn up chiefly from the recent "Revision of the North American Polemoniaceæ" by Dr. GRAY, in *Proc. Amer. Acad.*, Vol. VIII., pp. 247–282, (1870.) Mexican and S. American species omitted.

I. Stamens unequally inserted.

1. PHLOX. Corolla salverform. Filaments short, included. Ovules 1–5 in each cell. Seeds unchanged when wetted, the simple integument adherent to the albumen.—Leaves entire, at least the lower ones opposite.

2. COLLOMIA. Corolla salverform or funnelform. Filaments slender, usually exserted. Ovules solitary, or few–many in each cell. Seeds mucilaginous when moistened and giving out spiricles.—Leaves all or mostly alternate, usually pinnately parted or incised.

II. Stamens equally inserted. Seeds mostly giving out spiricles or mucilaginous when wetted.

3. GILIA. Corolla varying from salverform to subrotate. Filaments not declinate and without appendages.—Leaves various.

4. POLEMONIUM. Corolla varying from funnelform to rotate. Filaments slender, more or less declinate, hairy-appendaged at base.—Leaves alternate, pinnately divided.

## PHLOX.

§ 1. Broad-leaved perennials; ovules solitary. Eastern species.

* Flowers on very short pedicels in compact cymelets forming a many-flowered panicle or thyrse; stem tall, strict; corolla-lobes entire.

1. P. PANICULATA, L. From Pennsylvania to Illinois, and southward to Georgia and Arkansas.

2. P. MACULATA, L. From Pennsylvania to Michigan, and south to Florida, Mississippi and Arkansas.

* * Cymelets corymbed or occasionally simple; stems erect or spreading; corolla-lobes broad, entire or obcordate.

(*a*.) Glabrous and shining, the corymb or stem rarely scabrous-puberulent; calyx-lobes broad; corolla-lobes rounded, entire.

3. P. OVATA, L. Stems ascending from a decumbent or creeping base; leaves ovate, occasionally oblong-lanceolate, or the uppermost subcordate, the lowest narrowed to a petiole; calyx-teeth short-ovate or broad-lanceolate, acute.—Along the Alleghanies from Alabama to Pennsylvania.

4. P. GLABERRIMA, L. Stems slender, erect; leaves linear- or occasionally oblong-lanceolate, or the uppermost narrowly ovate-lanceolate, on the upper part of the stem gradually narrowed from the base, acuminate, nearly nerveless, subrevolute on the margin, the upper surface glossy; calyx-teeth triangular- or lanceolate-subulate, very acute.—From Ohio and Wisconsin to Florida and Louisiana.

(*b*.) Pilose or glandular; teeth of the more or less hairy and usually viscid calyx elongated and narrow; corolla-lobes sometimes retuse or obcordate.

(1.) Without stolons.

5. P. FLORIDANA, Benth. Strict, 2° high, a little hairy or nearly glabrous; leaves linear- or oblong-lanceolate, rather rigid; top of the stem and corymb glandular; teeth of the glandular calyx lanceolate-setaceous; corolla-lobes obovate, entire.—Florida.

6. P. PILOSA, L. Villous, pilose, or pubescent, sometimes glabrate; stem erect, slender, 1–2° high; leaves lanceolate and linear; corymb at length open; calyx rough-villous or subviscid-pubescent, the teeth subulate-setaceous, elongated or very slender, sometimes with an awnlike apex; corolla-lobes obovate, entire.—From New Jersey to the Saskatchewan, and south to Florida and W. Texas.

7. P. AMŒNA, Sims. Pubescence soft, rarely roughish, more or less villous; stems ascending, simple, 6–15′ high; leaves suberect, oblong or lanceolate or linear-lanceolate, acutish or obtuse, the highest bracteating the compact corymb; calyx-teeth narrowly subulate, very acute, scarcely awned.—Kentucky and Virginia to Florida.

(2.) Somewhat stoloniferous; leaves broad, rather short.

8. P. DIVARICATA, L. Corolla-lobes obcordate or cuneate, emarginate, or sometimes (Var. *Laphamii*, Wood,) entire.—From Canada to Wisconsin and Dakota, and south to Florida, Alabama, Arkansas and the Platte.

9. P. REPTANS, Michx. Pennsylvania and Kentucky to Georgia; Arkansas, (Nuttall.)

* * * Few-flowered, low, diffuse; leaves linear; corolla pale-violet, with 2-cleft cuneate lobes, the segments narrow.

10. P. BIFIDA, Beck. Pubescent, with the leaves sometimes glabrate; corolla-lobes cleft at least to the middle, the divisions nearly linear.—Illinois and Missouri.

11. P. STELLARIA, Gray. Glabrous, cæspitose, somewhat perennial at base; leaves narrow-linear and rather rigid, the upper slightly ciliate at base; peduncles elongated, mostly 1-flowered; corolla pale-blue or nearly white, the lobes bifid with short-oblong segments.—Cliffs of the Kentucky River, only by Dr. Short.

§ 2. Slightly suffrutescent perennial eastern species, with subulate fascicled evergreen leaves; ovules 1–2 in each cell; corolla lobes only obcordate.

12. P. SUBULATA, L. Usually with a long style and solitary ovules.—Southern New York to Michigan, and south to Florida and Mississippi.

§ 3. Species of the Rocky Mts. and westward, or arctic, somewhat woody or rarely herbaceous at base, the ovules 1–3 in each cell; branches 1–few-flowered; leaves mostly narrow or small, usually more or less cartilaginous-thickened (or rather revolute) on the margin.

* Matted-cæspitose subshrubby evergreen perennials; leaves short, sometimes very small, crowded or imbricated and fascicled up to the very flowers, scarious-connate at base, the older ones marcescent; flowers solitary, sessile, (in *P. Douglasii* sometimes short-peduncled;) ovules solitary.

(*a.*) Leaves with webby hairs, at least upon the margin.

(1.) In mosslike cushions, the very short broadish or scalelike leaves imbricated, soft, and merely mucronate; corolla-lobes entire.

13. P. RICHARDSONII, Hook. Rather loosely matted; leaves oblong-lanceolate, 3″ long, somewhat sparingly woolly, with thickened margins, soon reflexed, imbricated, loosely spreading when old; corolla-tube half longer than the calyx, the lobes broadly cuneate-obovate, 3″ long.—Arctic Coast.

14. P. BRYOIDES, Nutt. More densely matted and very small, with an abundant very soft wool; branchlets separated; leaves scalelike, closely imbricate in four rows, ovate- or triangular-lanceolate, 1½″ long, very close and appressed even when old, the margins subinflexed; corolla-tube a little exceeding the calyx, the cuneate lobes 1½″ long.—Rocky Mts. of W. Wyoming. (Nuttall.)

15. P. MUSCOIDES, Nutt. Resembling the last; branches short and very crowded; leaves less strictly 4-ranked, more sparingly woolly, ovate-lanceolate, 1½″ long, slightly mucronate; calyx equaling the corolla-tube.—Rocky Mts., only by Wyeth.

(2.) Leaves more rigid, subulate, somewhat acerose, 3–4″ long, less closely imbricated; flowers white.

16. P. HOODII, Rich. Rather sparingly woolly, glabrate; leaves erect; corolla-tube not exceeding the calyx, the lobes obovate, entire, 2–2½″ long.—Montana and the Saskatchewan region.

17. P. CANESCENS, T. & G. More woolly and leaves spreading; corolla more or less exceeding the calyx, the lobes 3–4″ long, entire or emarginate. See page 259.

(*b.*) Leaves more rigid, hirsute- or roughish-ciliate on the margins, at least at base, or sometimes naked.

18. P. CÆSPITOSA, Nutt. Leaves linear-subulate or oblong-linear, rigid, close, ciliate, otherwise glabrous or sparingly glandular; corolla-tube a little exceeding the calyx. See page 259.

19. P. DOUGLASII, Hook. Pubescent or nearly glabrous; leaves rather rigid, acerose, more usually spreading and less close, the margins either naked or ciliate at base; corolla-tube more or less exceeding the calyx. See page 260.

* * Showy, from a many-branched or loosely cæspitose woody or sometimes herbaceous base; leaves usually longer, linear or lanceolate, rarely subovate, loose and not fascicled or but slightly so; flowers solitary or subcymose, rather long peduncled.

(*a.*) Style elongated.

(1.) Arctic; leaves and loosely cæspitose stems somewhat lax.

20. P. SIBIRICA, L. 2–4′ high, hairy-pubescent; leaves narrow-linear, usually a little villous on the margin; peduncles naked, 1-flowered; corolla-tube equaling or a little exceeding its obcordate or retuse lobes and the calyx; ovules in pairs.—Kotzebue Sound and E. Siberia.

(2.) Of temperate regions; the leaves and erect or ascending woody-based stems rather rigid; corolla-tube exceeding the narrow-subulate calyx-lobes. The first two species mostly narrow-leaved and the calyx usually angled.

21. P. LINEARIFOLIA, Gray. Glabrous or sometimes roughish-pubescent above, 6–12′ high, corymbosely many-flowered; leaves very narrowly linear, 1–2′ long; calyx strongly angled by the folded intercostal membranes, the teeth acerose-subulate; corolla-tube a little longer, the lobes obovate-cuneate, entire or rarely retuse; ovules in pairs.—Idaho and Washington Territories.

22. P. LONGIFOLIA, Nutt. Glabrous or pubescent, 2–12′ high; leaves very narrow or sometimes lanceolate or oblong-lanceolate, ½–3′ long; corolla-lobes entire or retuse; ovules usually solitary. See page 260.

23. P. ADSURGENS, Torr. Glabrous, excepting the glandular-pubescent subcymose inflorescence; stems diffuse, ascending, slender, about 1° high; leaves ovate or ovate-lanceolate, acute, ½′ long, usually much shorter than the internodes; corolla-tube nearly 1′ long, about twice longer than the subterete calyx, the lobes 5″ long, obovate, entire; style exserted; ovules solitary.—Cañon Pass, Oregon; only by Wood.

(*b.*) Style usually shorter than the stigmas and ovary; calyx cylindrical, with subulate lobes.

24. P. SPECIOSA, Pursh. Somewhat viscid-puberulent or glabrate, 1–4° high, the branches ascending from a woody decumbent base; leaves lanceolate or linear, 1½–2′ long, the upper mostly dilated at base; flowers corymbed; corolla pink or white, the tube a little exceeding the calyx, the lobes obcordate, (or in Var. SABINI, obovate and entire or retuse;) ovules solitary.—From Washington Territory to California. Var. WOODHOUSII is a dwarf Arizona form with linear leaves, not dilated at base, and smaller flowers.

25. P. NANA, Nutt. Glandular-pubescent or roughish, sometimes glabrate, branches spreading from a woody base, 6–12′ high; leaves linear, often alternate on the branches; flowers scattered; corolla pink or white, the tube a little longer than the calyx, the limb 12–15″ broad, with very broadly cuneate-obovate lobes, entire or slightly erose; ovules 2 or usually 3 in each cell.—Western Texas to New Mexico and S. Colorado.

§ 4. Annual Texan species, loosely branched, more or less viscid-hairy; leaves rather broad, the upper alternate; calyx-lobes shortly bristle-tipped, soon recurved or spreading, splitting nearly to the base in fruit; style shorter than the stigmas; seeds somewhat wing-angled.

26. P. DRUMMONDII, Hook. Leaves usually lanceolate or oblong, the upper subcordate at base and half-clasping; flowers corymbed; ovules solitary.

27. P. RŒMERIANA, Scheele. Low, loosely branched from the base, subglabrous; leaves lanceolate, oblong, or the lowest spatulate, the cauline mostly alternate, hirsute on the margins; flowers scattered; corolla pink, the tube about equaling the spreading linear segments of the hirsute calyx, shorter than the very broadly obovate (6–9″ long) lobes; ovules 4–5 in each cell.

## COLLOMIA.

§ EUCOLLOMIA, Gray. Ovules solitary (in *C. heterophylla* 2–3) in each cell; annuals, more or less viscid-pubescent

* Leaves sessile, simple; flowers usually crowded; calyx obconical; corolla narrow; seeds with very abundant spiricles.

(*a.*) Flowers in crowded leafy-bracted heads, or the lowest subsolitary in the forks.

1. C. GRANDIFLORA, Dougl. 1–2° high; calyx-lobes broad, obtuse; corolla 1′ long, salmon-color. See page 261.

2. C. LINEARIS, Nutt. Smaller; calyx-lobes triangular-lanceolate, acute; corolla ½′ long. See page 261.

(*b.*) Flowers scattered, all solitary in the forks.

3. C. TENELLA, Gray. Low, loosely branched; leaves linear; calyx-lobes triangular, acute; corolla purplish, 3–4″ long. See page 262.

* * Leaves sessile, entire, the lower usually opposite; flowers loosely cymose or scattered; calyx rounded at base, nearly 5-parted; seed-coat without spiricles.

4. C. GRACILIS, Dougl. Low, spreading; leaves oval to linear; calyx-lobes subulate-linear; corolla purplish, 5″ long. See page 262.

* * * Leaves pinnately divided, incised or 3–5-parted, the lower petioled, alternate; calyx obtuse at base; corolla purplish, slender, 5–6″ long, 2–3 times exceeding the calyx: seed spiricles beneath a delicate epidermis.

5. C. GILIOIDES, Benth. ½–2° high; leaves nearly simply divided; flowers loose or scattered; calyx deeply cleft with linear-subulate lobes; cells 1–2-ovuled; capsule globular.—W. California.

6. C. HETEROPHYLLA, Hook. Low, diffuse; leaves mostly bipinnatifid, the uppermost less cut or even entire; flowers subcapitate or clustered; calyx-lobes shorter, ovate-lanceolate; stamens very unequally inserted; cells 2–3-ovuled; capsule ellipsoidal.—British Columbia to California.

§ 2. PHLOGANTHEA, Gray. Ovules numerous (6–12) in each cell; filaments unequal and unequally inserted, sometimes a little declined; leaves or their lobes narrow-linear, entire; flowers in a thyrse or scattered; seeds with spiricles. Annual or biennial, slightly if at all viscid.

* Cauline leaves very numerous, alternate, pinnately parted with 3–7 entire narrow-linear or subfiliform segments; corolla salverform, the tube narrow.

7. C. CAVANILLESIANA, Don. Biennial or perhaps perennial, more or less pubescent, virgately branched, leafy; flower-clusters small, in a narrow leafy thyrsus; corolla ½′ long, the tube a little expanded, 2–3 times exceeding the calyx, lobes oblong; anthers round; cells 5–7-ovuled.—W. Texas to Arizona and Mexico.

8. C. THURBERI, Gray. Like the last but minutely pubescent, inflorescence more spicate; corolla-tube over 1′ long, and 3–4 times exceeding its orbicular lobes and the calyx; anthers short-oblong; cells 8–9-ovuled.—New Mexico.

9. C. LONGIFLORA, Gray. Annual, glabrous, loosely paniculate-branched, 1–2° high; peduncles 1-flowered, loosely subcorymbose; calyx-lobes shorter than the tube; corolla white, the tube often 1½′ long, not dilated; lobes rounded or obovate: anthers oblong; cells 10–12-ovuled.—W. Nebraska to Texas and Arizona.

* * Leaves entire, scattered; corolla funnelform.

10. C. LEPTALEA, Gray. Annual, low, glabrous or nearly so, effusely paniculate-branched; pedicels scattered, 1-flowered, slender; corolla ½′ long; cells 6-ovuled. See page 262 and Plate XXV.

## GILIA.

Series I. Leaves sessile, palmately divided (rarely entire) with narrow entire segments, opposite or the uppermost and rameal ones sometimes alternate, (in § 5 nearly all alternate:) seed-coat without spiricles, usually mucilaginous. §§ 1–5.

§ 1. DACTYLOPHYLLUM, Gray. Corolla campanulate, nearly rotate, or short-funnelform, with obovate lobes; filaments slender; anthers oval; ovules usually numerous in each cell and the seeds more or less mucilaginous. Low or slender annuals, with scattered flowers and mostly opposite leaves.

* Flowers short-pedicelled or subsessile in the forks, somewhat crowded; corolla campanulate, the lobes entire; leaves mostly 3-parted.

1. G. DEMISSA, Gray. 2–3′ high, divaricately much-branched, glabrous or slightly hairy; leaflets acerose; calyx nearly 5-parted, with unequal lance-subulate scarious-margined segments, the longer often leaf-like lobes equaling the white (3″ long) corolla; stamens included, inserted at the base of the corolla; cells 6–7-ovuled.—S. E. California; W. Arizona.

* * Flowers loose or scattered, pedicels mostly capillary; corolla subrotate or short-funnelform, its lobes entire; leaves 3–7-parted, often alternate above, minutely scabrous or hirsute or subglabrous, the lobes mostly nearly filiform.

2. G. LINIFLORA, Benth. 6–18′ high; corolla white, rotate, nearly 5-parted; filaments pubescent at base; cells 6–8-ovuled. See page 262.

3. G. PUSILLA, Benth. 2–6′ high; corolla purplish or white, short-funnelform, the lobes equaling or exceeding the throat and tube; filaments nearly glabrous; cells 3–5-ovuled. See page 262.

4. G. BOLANDERI, Gray. Like the last; corolla purplish, 3–4″ long, the narrow tube rather exceeding the very short throat and nearly oblong lobes and nearly equaling the cylindric calyx-tube; cells 2–5-ovuled; pedicels sometimes 1½′ long.—N. W. California.

5. G. AUREA, Nutt. 2–4′ high; leaflets narrow-linear, hardly 3″ long; pedicels rather short, subcymose; corolla mostly yellow, open funnelform, 4–6″ broad, the rounded-obovate spreading lobes about equaling the throat and very short tube; filaments inserted near the sinuses, glabrous; cells about 10-ovuled.—New Mexico to Southern and Middle California.

* * * Flowers solitary or 2–3 together terminating the branches, on shortish pedicels; corolla broadly short-funnelform, the lobes fringe-toothed or erose; leaves entire, opposite, narrow-linear.

6. G. DIANTHOIDES, Endl. 2–5, high, branching; corolla ½–1′ long, lilac or purplish; filaments glabrous, inserted near the base; cells 12–20-ovuled.—S. California. Varying greatly in the size and hue of the flowers and denticulation of the lobes.

§ 2. LINANTHUS, Endl. Corolla salverform, the tube about equaling the cylindric calyx-tube, the broad cuneate-obovate lobes usually minutely erose; stamens included; filaments slender, inserted near the middle of the tube; capsule cylindric or oblong; cells 20–40-ovuled. Erect, slender, glabrous annuals; leaves opposite, filiform, 3–5-divided or sometimes simple; flowers white, subsessile, terminal and in the forks; calyx scarious except the elongated acerose-linear ribs.

7. G. DICHOTOMA, Benth. Corolla-lobes ½–1′ long; anthers linear; seeds with a white finely reticulated non-mucilaginous coat.—California.

8. G. BIGELOVII, Gray. Corolla-lobes 2″ long, hardly exceeding the calyx; anthers oval, seed-coat close, mucilaginous. See page 263 and Plate XXV.

§ 3. LEPTOSIPHON, Endl. Corolla salverform with usually a long filiform tube and very short more or less cup-shaped throat, in which the stamens are inserted; anthers short; ovules 6–16 in each cell. Low or slender annuals, with opposite narrow leaves and showy flowers in crowded bracteate clusters.

* Hairy, leafy-stemmed; leaves palmately 5–7-parted, with linear-filiform lobes, commonly fascicled in the axils; corolla-lobes entire, exceeding the slender more or less exserted filaments; cells 6–10-ovuled.

(*a.*) Corolla large, the tube scarcely exceeding the obovate lobes and rarely the villous-hirsute bracts.

9. G. DENSIFLORA, Benth. 1–2° high; leaflets numerous, subrigid; corolla-limb 1′ in diameter, lilac or nearly white; anthers nearly included.—W. California.

(*b.*) Small and more slender, the filiform corolla-tube 3–6 times exceeding the oval or ovate (1½–4′ long) lobes. (Species difficult of definition.)

10. G. ANDROSACEA, Steud. Corolla-tube 1′ long or less, much exserted and thrice longer than the lobes; bracts hirsute or villous-ciliate. See page 263.

11. G. MICRANTHA, Steud. Corolla-tube extremely slender, ¾–1½′ long, 4–6 times exceeding its (2–3″ long) lobes; bract and floral leaves softly pubescent. See page 264.

12. G. TENELLA, Benth. Small, mostly depressed, corolla-tube less slender, 6–9″ long, lobes 1½″ long; bracts and leaves rather hispid-ciliate.—Puget Sound to S. California.

13. G. CILIATA, Benth. More rigid, rough; corolla-tube 6–7″ long, scarcely exserted; lobes 1¼″ long; bracts and leaves very hirsute-ciliate; calyx-lobes acerose. See page 264.

* * Entire-leaved, glabrous, dwarf; corolla-lobes cuneate, undulate-toothed or 1–3-dentate at the broad apex; anthers sessile, included in the throat; cells 10–16-ovuled.

14. G. NUDICAULIS, Gray. 1–4′ high; stem naked, the capitate flowers bracteate with several ovate-lanceolate or lanceolate leaves; corolla-tube 3–4″ long, the lobes 2–3″ long. See page 264.

§ 4. SIPHONELLA, Gray. Like *Leptosiphon*, but the corolla-tube not exceeding the narrow calyx, the throat more funnelform, the cells few-ovuled, and the flowers less crowded. Perennials, sometimes woody at base, soft-puberulent; calyx firm, becoming 5-parted, the lance-subulate lobes with thickish margins, the sinuses not membranous nor scarious; corolla nearly white, the tube puberulent, lobes obovate; filaments short, subexserted; anthers oval-oblong.

15. G. NUTTALLII, Gray. Stems numerous, slender, 6–12′ high; leaves 3–7-parted, narrow linear, mucronate, usually shorter than the internodes; flowers in leafy clusters; ovules in pairs. See page 264 and Plate XXV.

16. G. FLORIBUNDA, Gray. 1° high or more; base more shrubby; leaflets nearly acicular, usually equaling the internodes; flowers in a rather loose corymbose cyme, sometimes pedicelled; cells 4-ovuled.—S. California and Arizona.

§ 5. LEPTODACTYLON, Benth. Corolla salverform, the tube at length exceeding the calyx, the throat somewhat funnelform; anthers short, on short filaments inserted near the throat, included; ovules numerous; seed-coat close, without mucilage or spiricles. Tufted leafy suffrutescent perennials; leaves alternate or opposite, fascicled in the axils, palmately 3–7-parted, the entire segments and the calyx-lobes acerose or subulate, pungent; flowers sessile, solitary upon the short branchlets or in few-flowered terminal clusters.

* Leaves opposite; stems short, herbaceous.

17. G. WATSONI, Gray. 4–6′ high; leaves not much fascicled; corolla-tube and lobe each ½′ long; cells 10-ovuled. See page 265 and Plate XXVI.

* * Leaves alternate, more rigid, thickly fascicled in the axils; stems woody.

18. G. CALIFORNICA, Benth. Leaves very close, becoming widely spreading, and with the branches

at first loosely tomentose-pubescent or villous; corolla limb 1½' in diameter; lobes broad, often sub-erose anthers linear-oblong, included; cells 20-ovuled or more.—California.

19. G. PUNGENS, Benth. Viscid-pubescent, puberulent or glabrate leaves mostly suberect or strict; corolla-lobes usually narrower and but half as long; anthers in the throat, oblong; cells 8–10-ovuled.—Very variable. See page 265.

Series II. Leaves alternate and pinnately divided, lobed, or toothed, rarely entire and the lowest occasionally opposite. Filaments slender. Seed-coat developing mucilage and spiricles, (excepting Nos. 44, 47, 48, 57 and 58.) §§ 6–12.

§ 6. NAVARRETIA, Gray. Flowers in densely leafy-bracteate heads; lobes of the calyx and of the mostly multifid or nearly palmate bracts rigid and acerose-pungent or spinulose, sometimes laciniate or unequal; corolla slender funnelform, lobes rather small, oblong; stamens inserted below the throat; anthers short; ovary sometimes dimerous. Low branching usually viscid annuals; leaves 1–2-pinnately cleft or incised, the lobes usually subulate, pungent; seed-spiricles shorter than usual.

* Some of the leaves and bracts more than once pinnatifid; corolla violet or whitish; stamens included, commonly unequal; cells 8–12-ovuled; viscid and unpleasantly scented.

20. G. SQUARROSA, H. & A. Stoutish, rigid, 1° or less high; upper leaves and bracts spinescent; corolla-tube hardly equaling the mostly entire calyx-lobes.—California, Oregon.

* * Leaves somewhat 2-pinnatifid; stamens exserted; cells 1–4-ovuled.

21. G. COTULÆFOLIA, Steud. Rigid, 5–12' high, pubescent or glabrate below, minutely glandular above; leaves mostly bipinnately parted, the upper ones spinescent-lobed; corolla blue or whitish, the tube hardly exceeding the sparsely villous calyx-lobe; cells (often but two) 1- or rarely 2-ovuled.—California.

22. G. INTERTEXTA, Steud. Stem white-pubescent, 1–10' high; leaves glabrous, except at base; base of bracts and the calyx-tube densely white-hairy; corolla white, 4'' long; cells 3–4-ovuled and seeded. See page 266.

23. G. MINIMA, Gray. Smaller, 1' high, white-pubescent; leaves and bracts glabrous; calyx white-villous in the sinuses; corolla white, 1½'' long, shorter than the calyx-lobes; cells 1-ovuled. See page 266.

24. G. BREWERI, Gray. 1–6' high, glandular-puberulent throughout, without white hairs; heads less dense; corolla yellow, 3–4'' long, equaling the entire calyx-lobes; cells 1–2-ovuled. See page 266.

25. G. LEUCOCEPHALA, Gray. Slender, 3–6' high; top of the stem and of the thin calyx-tube white-hairy, otherwise glabrous; leaves soft, with filiform usually entire lobes, those of the bracts barely pungent; head dense; corolla white, 4'' long, exceeding the calyx; stamens exserted; cells 2-ovuled.—Sacramento Basin.

* * * Leaves and bracts 1-pinnatifid or incised, or subentire; calyx-lobes entire, except in *G. viscidula*; stamens more or less exserted; corolla purple, rarely white or yellowish.

(*a.*) Very slender, erect, 3–10'' high; branches divergent, subnaked; leaves filiform or acicular, few-lobed; inner bracts subpalmately parted.

26. G. FILICAULIS, Torr. Very minutely glandular above; branches effusely panicled; leaves sparse, subsetaceous; flowers in small rather naked heads, 3'' long, the slender tube long exceeding the lanceolate-subulate scarcely pungent calyx-lobes; cells 1- (rarely 2-?) ovuled.—Central California.

27. G. DIVARICATA, Torr. Diffuse or very open, somewhat viscidly pubescent above; leaf-lobes subulate-filiform, the upper leaves and bracts more rigid and pungent; corolla 3–5'' long, the more funnelform tube slightly exceeding the setaceous-subulate pungent calyx-lobes; cells 5–7-ovuled.—Central California.

(*b.*) Stouter, viscid, erect, 2–8' high; leaves rigid, the bracts at least dilated at base, often cartilaginous, the lobes spinescent; heads dense.

28. G. VISCIDULA, Gray. Cauline leaves mostly slender, with setaceous subulate lobes, the bracts broader and more spiny, the teeth ascending; corolla 4–6'' long, twice exceeding the lanceolate-subulate and sometimes incised calyx-lobes; cells 1–4-ovuled.—California.

29. G. ATRACTYLOIDES, Steud. Very viscid-puberulent and rigid; leaflets divaricate and subulate-spiny, seldom longer than the breadth of the rachis; corolla about twice longer than subulate calyx-lobes.—S. California.

(*c.*) Depressed, scarcely viscid; the rigid leaves (6–9'' long) more or less dilated upward, the teeth and the calyx-lobes tipped with long bristles; flowers scarcely clustered, not capitate.

30. G. SETOSISSIMA, Gray. Leaves narrowly cuneate; corolla 6–9'' long, much exserted; anthers oblong; capsule oblong; cells 6–10-ovuled, (*Gray.*)—An ovary from Dr. Newberry's original specimens has the cells 6-ovuled. Dr. Palmer's mature plants have the cells 2-3 seeded. See page 267.

31. G. Schottii, S. Watson. (*Navarretia*, Torr.) Leaves linear, scarcely dilated above, corolla 5″ long, tube not exserted; anthers subrounded, smaller; capsule ovate, cells 4–6-seeded, (3-5 ovuled, *Gray*.)—Referred to the last by Dr. Gray as Var. exigua. See page 267.

§ 7. HYGELIA, Gray. Flowers capitate-clustered, the base of the numerous 3–5-cleft leafy bracts and the calyx densely clothed with white wool, the lobes acerose or subulate, cuspidate; corolla salverform, blue or whitish, tube slender, lobes usually oblong; anthers exserted, mostly linear-sagittate; ovules very variable.—Herbage more or less floccose-woolly, not viscid nor glandular; leaves simply pinnately parted or some of them entire, acerose or subulate-filiform.

* Root perennial; stem rigid; anthers linear-sagittate.

32. G. densifolia, Benth. Stems 6–12′ high, simple or sparingly branched, leafy to the top, with 1–few heads; leaves rigid, mostly short-lobed; corolla-tube ½′ long, 2–3 times exceeding the calyx.—S. California.

* * Annual, the stems at length paniculate-branched, slender; leaves or their mostly few segments filiform.

33. G. virgata, Steud. Commonly strict and at first simple, 6–12′ high; lower leaves mostly entire; corolla-tube at length usually exsert, the lobes 3″ long; anthers linear-sagittate, 1″ long; cells 2–3-ovuled.—California.

34. G. floccosa, Gray. More slender, becoming diffusely panicled; heads and flowers smaller; anthers linear-oblong, hardly over ½″ long; cells usually 1–2-ovuled. See page 267.

35. G. filifolia, Nutt. Slender, rather rigid; leaves mostly 3-parted; flowers still smaller, the lobes 1–2″ long and tube scarcely exsert; anthers oval, ½–⅓″ long; cells usually 4–6-ovuled. See page 267.

§ 8. ELAPHOCERA, Nutt. Flowers in crowded bracteate heads, or rarely rather loose and cymose; corolla white or purplish, salverform, the tube seldom much exceeding the cuspidate or awned, not pungent calyx-lobes; stamens inserted in or near the sinuses, shorter than the oval or oblong corolla-lobes. Low or dwarf annuals, biennials or short-lived perennials, more or less woolly-pubescent; calyx and bracts mostly pubescent or ciliate with long rather viscid jointed hairs.

* Leaves entire, acerose-subulate or filiform; flowers crowded; filaments slender, exserted.

36. G. Wrightii, Gray. Stems 1° high, rigid, virgate, woody at base, leafy throughout; leaves rigid, cuspidate-mucronate; bracts broad-lanceolate, the larger ones sublaciniate, awned-cuspidate as are the subulate calyx-lobes, ciliate; corolla-tube 4″ long, twice exceeding the oblong lobes; cells 3–4-ovuled.—W. Texas.

37. G. Gunnisoni, T. & G. Annual, slender, loosely paniculate; leaves scattered, linear-filiform; calyx-lobes and entire bracts short and short-cuspidate; flowers in small heads terminating slender branchlets. See page 268.

* * Leaves mostly pinnately parted, sometimes all entire; segments few, narrow-linear: filaments shorter than the corolla-lobes; corolla-tube scarcely at length exceeding the calyx: flowers closely capitate-clustered. Biennial or perennial, the simple or clustered stems hardened at base.

38. G. spicata, Nutt. Rather stout, erect, 4–10′ high; flower-clusters crowded into an interrupted leafy virgate spike, or in a single thick head, (Var. capitata;) leaves sub-3-cleft or often all entire, and with the calyx-lobes barely if at all mucronate; corolla-lobes shorter than the scarcely exserted tube; anthers subsessile; cells 4–6-ovuled.—Colorado.

39. G. congesta, Hook. Stems erect, diffuse, or depressed, with single or few and corymbose close heads; leaves with 3–7 mucronate lobes or entire; calyx-lobes usually short-awned, equaling the corolla-tube; filaments equaling or exceeding the anthers; cells 2–4-ovuled. See page 268.

40. G. iberidifolia, Benth. Leaves more rigid, calyx-lobes and bracts more strongly cuspidate; heads looser, corymbose; filaments shorter; ovules solitary.—Nebraska and Wyoming.

* * * Leaves pinnatifid, trifid or subentire; flowers leafy-bracted, cymulose-glomerate or at length loose; calyx and bracts awned-cuspidate. Low branching annuals.

41. G. pumila, Nutt. Stem somewhat loose-woolly, leafy; divisions of the leaves narrow-linear; corolla-tube twice exceeding the calyx; filaments slender; cells about 6-ovuled. See page 268.

42. G. polycladon, Torr. Stems puberulent or subpubescent, few-leaved; leaf-segments short, oblong; corolla-tube hardly exceeding the calyx; filaments very short; cells 2-ovuled. See page 268.

§ 9. Ipomopsis, Benth. Thyrsoid-panicled, the bracts small or none; corolla (scarlet or orange) tubular-funnelform, the tube greatly exceeding the subulate calyx-lobes and the spreading ovate or lanceolate lobes of the limb; stamens inserted in the throat or below the sinuses, shorter than the corolla; ovules numerous. Biennials, smoothish or a little hairy; leaves simply pinnatifid.

* Tall, leafy-stemmed; leaves pinnately parted, the segments filiform or narrow-linear.

43. G. coronopifolia, Pers. Glabrous or nearly so, 2–6° high, very leafy; leaflets and rachis nearly

filiform, acute and mucronate; flowers very many, in a virgate compact thyrsus; calyx-lobes setaceous-subulate; corolla 1–1½′ long, the ovate leaves moderately spreading; seed-coat loose, reticulate-cellular, without mucilage or spiricles.—S. Carolina and Florida to Arkansas and W. Texas.

44. G. AGGREGATA, Spreng. Somewhat pubescent, less leafy, often loosely branching and paniculate; leaf-segments narrow-linear, mostly bluntish; calyx commonly glandular, with subulate lobes; corolla-lobes spreading or recurved. See page 269.

* * Leaves chiefly at the base, barely pinnatifid-incised; about 1° high.

45 G. SUBNUDA, Torr. Glandular-puberulent, loosely panicled; flowers rather crowded; corolla-tube ½′ long; anthers included on very short filaments. See page 269.

§ 10. GILIANDRA, Gray. Thyrsoid-panicled and resembling § *Ipomopsis*, but the white or bluish corolla salverform, the tube about twice longer than the calyx and little exceeding the obovate lobes; filaments exserted beyond the corolla; anthers ovate; cells 6–8-ovuled; seeds without mucilage or spiricles. Glandular-puberulent biennials, with simply pinnatifid leaves and rather small flowers.

46. G. STENOTHYRSA, Gray. Stem stout, simple, very leafy, with a virgate thyrsus; leaf-lobes short, oblong, the floral leaves small and entire; corolla ½′ long, white. See page 269.

47. G. PINNATIFIDA, Nutt. 9–18′ high, glabrate below; leaf-segments linear or narrow-oblong, sometimes 1–2-lobed; panicle compound, loosely branched; bracts linear or subulate, few; corolla blue or purplish, the tube and lobes each usually 2″ long; stamens 3″ long.—Northern New Mexico, Colorado, and to S. Idaho.

§ 11. MICROGILIA, Benth. Flowers very small, scattered along the slender branches in loose spikes or panicles; calyx short-campanulate, 5-toothed; corolla white, salverform, the tube a little exserted and slightly exceeding the lobes; stamens inserted on the tube, included; anthers very short; ovules solitary. Much-branched subglabrous annuals, with small filiform or slender subulate leaves, entire or the cauline 3-parted.

48. G. MINUTIFLORA, Benth. Glabrous or glandular-puberulent above, 1–2° high, rather rigid; upper leaves reduced to minute scattered bracts; flowers terminal or often spicate along the strict branchlets; calyx-teeth short, ovate-subulate, half as long as the narrow tube of the (scarcely 2″ long) corolla; filaments slender; capsule ellipsoidal, 2″ long; seed oblong.—Colorado and Central Oregon.

49. G. TENERRIMA, Gray. 1½° high, glabrous; flowers loosely panicled, scattered on the slender branchlets; leaves entire; calyx-teeth ovate, nearly equaling the globose capsules; seed ovoid. See page 270.

§ 12. EUGILIA, Benth. Flowers panicled, capitate-clustered or more frequently scattered; bracts small or none; corolla purple, blue or white, funnelform, or nearly campanulate or rotate; filaments slender, in or near the sinuses, rarely exceeding the corolla; cells few–many-ovuled. Mostly annuals, with incised or 2–3-pinnately divided leaves.

* Flowers in a long-peduncled head-like cyme; corolla mostly blue, funnelform, its tubes equaling the lobes and not exserted; stamens at the sinuses; ovules rather numerous. Erect annuals, 1–3° high; leaves 2–3-pinnately divided, the segments very narrow.

50. G. CAPITATA, Dougl. Slightly pubescent or nearly glabrous, as is usually the calyx; corolla-lobes linear-lanceolate, nearly equaling the slightly dilated tube.—Oregon and California.

51. G. ACHILLEÆFOLIA, Benth. Glabrous with slight deciduous wool, or glandular; flowers larger; calyx more or less woolly, the lobes short-mucronate; corolla-lobes obovate or broad-oblong, the throat abruptly and widely dilated.—California.

* * Flowers rather crowded or in the latter species loosely panicled or scattered; corolla funnelform, with a more or less dilated throat; stamens inserted at or near the sinuses; ovules many. Low sometimes diffuse annuals, pubescent or glabrate; mostly Californian.

52. G. MULTICAULIS, Benth. Leaves mostly bipinnatifid with narrow-linear segments; flowers clustered, (often solitary in Var. TENERA,) terminating a slender peduncle, subsessile; calyx viscid, the tube twice longer than the teeth; corolla violet, the proper tube shorter than the calyx, the obovate or ovate lobes not exceeding the funnelform throat; capsule ovoid.

53. G. TRICOLOR, Benth. Diffuse; leaves 2–3-pinnatifid with linear or nearly filiform segments; flowers corymbed or clustered on rather short terminal peduncles, the pedicels shorter than the viscid-puberulent or rarely glabrous calyx; corolla-tube very short, the ample campanulate-funnelform throat yellow or orange below and deep-purple above, the roundish lilac or violet lobes exceeding the stamens.

54. G. TENUIFLORA, Benth. Slender; lowest leaves bipinnately parted or incised with short segments, or sometimes simply pinnatifid; flowers loosely panicled on slender pedicels; corolla purple or

pink, 7–9''' long, long-funnelform, 4–5 times exceeding the calyx, the proper tube usually much exserted, the broad obovate lobes exceeding the stamens.—S. California.

55. G. INCONSPICUA, Dougl. Lowest leaves 1–2-pinnatifid; flowers becoming loosely panicled or scattered, on slender pedicels; corolla purplish, 2–3 times exceeding the calyx, not exserted or slightly so, the lobes mostly exceeding the stamens. See page 270.

* * * Flowers minute, very loosely panicled, on slender pedicels; corolla whitish, narrow-funnelform or subcampanulate; stamens inserted nearly at the sinuses, shorter than the lobes; ovules many; the close seed-coat without mucilage or spiricles. Low diffusely much-branched annuals, with the radical leaves simply pinnatifid or incised.

56. G. LEPTOMERIA, Gray. Obscurely glandular; radical leaves slightly pinnatifid, the upper mostly linear and entire; flowers numerous; corolla slender-funnelform, the tube becoming twice longer than the calyx. See page 270, and Plate XXVI.

57 G. MICROMERIA, Gray. Lower leaves with oblong obtuse divaricate lobes, the upper linear, entire; pedicels long and capillary, scattered; corolla oblong-campanulate, 1''' long, little exceeding the calyx. See page 271, and Plate XXVI.

* * * * Flowers scattered, on slender pedicels, rather large; corolla blue or white, campanulate or rotate; anthers usually oblong; calyx-lobes lanceolate-subulate, exceeding the tube. Low or slender, diffuse.

58. G. CAMPANULATA, Gray. Annual, 2–3' high; lower leaves lanceolate, sparingly toothed, above linear-lanceolate and sometimes entire; corolla campanulate, moderately 5-lobed, the included stamens inserted at the base. See page 271, and Plate XXVI.

59. G. INCISA, Benth. Annual, minutely puberulent or glabrous, slender, 1–2° high, effusely panicled; lower leaves lyrate, the upper narrower and incised or toothed, on the branchlets nearly linear and entire; pedicels filiform, rigid; corolla rotate, almost 5-parted, the slender filaments inserted nearly in the sinuses; cells many-ovuled.—E. Texas to Mexico.

60. G. RIGIDULA, Benth. Perennial, glabrous or viscid-glandular, diffusely branched, a span high; leaves pinnately or the upper nearly palmately parted, the lobes lanceolate, linear or slender-subulate; corolla 9–16''' broad, blue, rotate, 5-parted, with broad obovate lobes; filaments slender, inserted in the sinuses; anthers linear or elongated-oblong; cells several-ovuled.—Texas to Arizona and Mexico.

## POLEMONIUM.

§ 1. Corolla funnelform, exceeding the calyx, the tube usually elongated; filaments barely hairy and scarcely dilated at base. Viscid-glandular musk-scented dwarf perennials, with creeping root-stocks and very small and numerous crowded leaflets.

1. P. CONFERTUM, Gray. Tufted; leaflets 3–5-cleft, segments round-oval to linear-oblong; flowers clustered, nodding, looser in fruit; calyx-tube twice longer than the narrow-lobes; corolla-tube exceeding the calyx and 2–4 times longer than its own rounded lobes. See page 271.

2. P. VISCOSUM, Nutt. More dwarf; leaflets entire, ovate or rounded, $1\frac{1}{2}'''$ long; flowers looser, subcorymbed; calyx subcampanulate, lobes broadish, equaling the tube; corolla-tube equaling the calyx, not exceeding its own lobes.—N. Colorado, (Nuttall.)

§ 2. Corolla rotate-campanulate, moderately exceeding the calyx; filaments dilated at base. Perennials, with laxer infloresence; leaflets entire, the upper often confluent.

3. P. CÆRULEUM, L. 1–3° high, leafy; flowers numerous; calyx cleft to the middle; stamens or style usually exsert; cells 7–12-ovuled, several-seeded. See page 272.

4. P. HUMILE, Willd. Pubescent, mostly glandular; stems a span high, 1–2-leaved; flowers few, subcorymbed, rather long-pedicelled; calyx cleft beyond the middle; cells 2–4-ovuled, 1–2-seeded.—Arctic America and Alaska, and southward in the mountains to Colorado and California.

5. P. REPTANS, L. Nearly glabrous, not viscid, 1° high, branching, leafy; leaflets 5–13; flowers few corymbed, nodding; calyx-lobes shorter than the tube; cells about 3-ovuled, usually 1-seeded.—N. York to Alabama and west to the plains.

§ 3. Corolla nearly rotate, shorter than the calyx; filaments dilated at base, very sparingly pilose-ciliate. A low annual; leaflets entire.

6. P. MICRANTHUM, Benth. Somewhat viscid-pubescent, diffusely branched, small and decumbent; leaflets 5–13; flowers scattered or solitary, white; calyx deeply 5-cleft; cells 2–3-ovuled. See page 272.

# CUSCUTA.

The following species belonging to this genus have been found within the limits of the United States and are here arranged and distinguished nearly as by Dr. GEORGE ENGELMANN in his revision of the genus, published in the *Transactions of the Academy of Science of St. Louis*, Vol. I., pp. 453-523, (1859.)

§ 1. EUGRAMMICA, Eng. Styles unequal, capillary; capsule bursting transversely, more or less regularly. Stems filiform or capillary.

* Calyx- and corolla-lobes ovate, obtuse; flowers short; capsule irregularly circumscissile.

1. C. APPLANATA, Eng. Flowers 1–1¼″ long, short-pedicelled or subsessile in dense often continuous clusters; lobes of the campanulate calyx equaling the broad campanulate corolla-tube and the spreading at length reflexed corolla-lobes; anthers oblong, equaling the short subulate filaments; scales large, wavy-laciniate, incurved; styles exserted; capsule depressed, 1″ in diameter, surrounded by the corolla; seeds strongly reticulate.—Arizona.

* * Calyx- and corolla-lobes acute; flowers larger; capsule almost always regularly circumscissile.

2. C. ODONTOLEPIS, Eng. Flowers 2½″ long, short-pedicelled, bracted, in at last large crowded clusters; calyx short-campanulate, deeply parted, the ovate-triangular lobes about equaling the deeply campanulate corolla; corolla-lobes ovate-lanceolate, spreading or reflexed, shorter than the tube; anthers ovate, equaling the short subulate filaments; scales broad-ovate, adnate to the middle, nearly reaching to the throat, coarsely dentate above; style exserted; ovary depressed-globose; capsule globose, hooded by the corolla; seeds oval, verrucose.—Arizona. Resembling *C. subinclusa.*

3. C. UMBELLATA, HBK. Flowers 1–2″ long, pedicelled, in loose compound fasciculate cymes; calyx broad-campanulate, with triangular lobes; corolla-lobes narrow-lanceolate, longer tnan the tube, spreading or reflexed; scales broad-oval, exceeding the tube, incurved; capsule small, thin, depressed, almost 4-lobed, sometimes irregularly bursting; seeds triangular, oblique.—W. Texas and Indian Territory to Arizona and Mexico.

4. C. LEPTANTHA, Eng. Flowers 4-parted, slender, 2-2½″ long, on filiform umbellately-fascicled pedicels; bracts ovate-acuminate; calyx globose-campanulate, granulate-hispid, the triangular lobes and the lanceolate erect-spreading corolla-lobes much shorter than the corolla-tube; anthers ovate, shorter than the filiform filaments; scales ovate, dentate-fimbriate, much shorter than the tube; ovary globose; styles at length exserted; capsule hooded with the slightly hispid corolla-tube; seeds globose-triangular.—W. Texas.

§ 2. CLISTOGRAMMICA, Eng. Styles unequal, cylindric; capsule baccate, never opening at base.

* Flowers pedicelled; sepals united; ovary and capsule globose-compressed, with walls of uniform thickness.

(*a.*) Flowers in simple or compound subglobose cymes; style usually short and thick; withered corolla remaining at the base of the capsule.

5. C. OBTUSIFLORA, HBK. Stems bright orange-color; inflorescence loose; calyx- and corolla-lobes obtuse, those of the corolla usually equaling the tube and soon reflexed; styles at last subulate; capsule large, depressed, almost naked, 4-seeded. Var. GLANDULOSA, Eng. Scales at least equaling the corolla-tube, deeply fringed, incurved; all parts of the flower dotted with red shining glands.—Florida and Georgia to W. Texas.

6. C. CHLOROCARPA, Eng. Resembling the last; lobes acute; flowers 1″ long, usually 4-parted, not glandular; scales small or wanting; capsule greenish-yellow.—Delaware; Illinois and Wisconsin to the Indian Territory.

7. C. ARVENSIS, Beyr. Flowers smaller, in more compound clusters; lobes of the calyx very obtuse, of the corolla acute, exceeding the tube, reflexed and the point inflexed; scales large, deeply fimbriate; styles rather slender.—Calyx quite variable. Virginia to Florida, and from Illinois and the Saskatchewan to Texas and New Mexico; Oregon.

(*b.*) Flowers in branching paniculate cymes; styles capillary, at least equaling the ovary; corolla enwrapping or capping the ripe capsule.

8. C. TENUIFLORA, Eng. Flowers short-pedicelled, 1″ long or less, mostly 4- often 3-parted; lobes all obtuse, much shorter than the slender corolla-tube; scales ovate or spatulate; capsule globose, hooded. See page 273. The southwestern form has rather larger flowers and capsules.

9. C. CALIFORNICA, Chois. Flowers 1–2¼″ long, on slender pedicels, loosely panicled; lobes all nar-

rower, acute or acuminate, erect or spreading; scales wanting or more or less developed; capsule enveloped in the corolla.—Quite variable. See page 273.

* * Sepals united; ovary and capsule with the walls thickened above, more or less conic.

(*a*.) Flowers subsessile, paniculate-glomerate; withered corolla capping the 1–2-seeded capsule.

10. C. SUBINCLUSA, Dur. & Hilg. Flowers 2–3‴ long, forming large clusters; calyx deeply cleft, the lobes acutish, imbricate; corolla-lobes ovate, acute, shorter than the slender tube; scales oblong, deeply fringed; styles slender; ovary 2-pointed; capsule oval.—S. and Central California.

(*b*.) Flowers pedicelled, in rather loose paniculate cymes, often becoming crowded; corolla-lobes acute or rarely obtuse, inflexed; styles unequal; capsule enveloped in the corolla.

11. C. DECORA, Chois. Flowers 1‴ long or more, white, often papillose; calyx-lobes ovate or lanceolate, acute; corolla-lobes ovate-lanceolate; scales large, broad-oval; styles usually stout.—Variable. Florida and from Illinois to Texas, the Indian Territory, New Mexico and Sonora.

12. C. INFLEXA, Eng. Flowers 1‴ long, like the last but with deeper subcylindric mostly 4-parted corollas, at last only capping the capsule; lobes erect; scales minute; styles divaricate.—Virginia to Georgia; Illinois to Arkansas, Kansas and the Upper Missouri.

(*c*.) Inflorescence as in the last; corolla-lobes obtuse, not incurved; withered corolla surrounding the base of the capsule.

13. C. GRONOVII, Willd. Flowers 1¼–1½‴ long; corolla-tube deeply campanulate, lobes flat, spreading; scales large, oval, much fringed.—Variable. Canada to Florida and west to Missouri, Arkansas and Texas. Var. (?) CURTA, Eng. With very short bifid or truncate appressed scales; corolla capping the large oval capsule.—N. W. America.

14. C. ROSTRATA, Shutt. Near the last; flowers 2–3‴ long, wider; scales rather small, deeply fringed; ovary elongated, bottle-shaped; capsule, with the elongated 2-pointed beak, 2½–3‴ long.—Maryland to S. Carolina.

* * * Sepals free, similar to the surrounding sterile bracts, imbricate; ovary and capsule more or less conic, thickened and fleshy at the apex; capsule capped with the corolla.

(*a*.) Flowers pedicelled, loosely panicled.

15. C. CUSPIDATA, Eng. Flowers about 2‴ long; upper bracts and the sepals ovate or orbicular, cuspidate or obtuse.—From Texas and New Mexico to the Platte.

(*b*.) Flowers closely sessile, crowded in compact often continuous clusters.

16. C SQUAMATA, Eng. Stems filiform, orange-yellow; clusters 2–12-flowered; flowers 2½‴ long; the 2–5 membranous bracts broad-ovate, cuspidate, appressed; sepals longer, more obtuse; scales ovate, fimbriate; styles capillary, exserted; capsule ovate, apiculate, 1–2-seeded.—W. Texas.

17. C. GLOMERATA, Chois. Clusters in two parallel continuous spiral lines, 6–10‴ thick; flowers 2½–3‴ long, often sterile; bracts numerous, squarrose; corolla-lobes obtuse.—From Ohio to Kansas and southward to W. Texas; mostly on *Compositæ*.

18. C. COMPACTA, Juss. Mostly on shrubs; fruiting clusters often 1–2′ in diameter; bracts (3–5) and sepals appressed, orbicular.—From N. New York to Georgia and Alabama, and the Var. ADPRESSA westward to Missouri and Texas.

§ 3. MONOGYNELLA, Eng. Styles united nearly to the apex, (or entirely,) thick and compressed; stigmas capitate; anthers sessile, (or nearly so;) capsule regularly circumscissile, usually 2-seeded.—Stems thick, growing on woody plants; flowers sessile or short-pedicelled, bracteate, spicate-panicled; capsule capped with the withered corolla.

19. C. EXALTATA, Eng. Lobes of the globose calyx nearly distinct, orbicular, concave, imbricate, verrucose in the middle, equaling the cylindric corolla-tube; corolla-lobes orbicular, imbricate, much shorter than the tube, erect or subspreading; anthers cordate-orbicular; scales 2-parted, dentate, short.—Flowers 2‴ long; capsule 3–5‴ long; seeds 1½‴ long or more. W. Texas and Mexico.

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## LYCIUM.

The North American species, as arranged by Dr. GRAY in the *Proc. Amer. Acad.*, Vol. VI, pp. 45–48, (1862,) with the addition of the more recent species.

§ 1. Flowers large; corolla funnelform-tubular, 9–10‴ long, greenish; calyx loosely campanulate, 5-cleft at least to the middle, with subfoliaceous spreading lobes; anthers deciduously mucronate. Glabrous.

1. L. PALLIDUM, Miers. See page 275.

§ 2. Flowers middle-sized but short, the corolla 6″ long or less, the 4–5 lobes of the rotately expanded limb longer than the tube. Glabrous with fleshy leaves.

2. L. CAROLINIANUM, Walt. From S. Carolina to the Rio Grande. Filaments very densely tomentose-bearded above the base.

§ 3. Flowers smaller, the corolla 2–6″ long and the lobes (usually much) shorter than the tube.

* Calyx deeply 5-cleft, the lobes equaling the tube and about half as long as the shortly 5-lobed narrow corolla; pedicels mostly none or very short. Puberulent, spiny.

3. L. MACRODON, Gray. Younger branches pubescent; leaves glabrate, spatulate-oblanceolate, nerveless, fascicled, 2–4″ long; pedicels not over 1½″ long; lobes of the minutely viscid calyx narrowly linear, twice longer than the shortly campanulate (1½″ long) tube; corolla 6″ long, narrow; anthers oval-oblong, scarcely exserted; filaments slightly hirsute toward the base.—California, (Frémont.)

4. L. PUBERULUM, Gray. Much-branched, 2–4° high; spines numerous, slender; leaves obovate or oblong-spatulate, 4–8″ long, 1-nerved beneath, fascicled, minutely pruinose-pubescent, as also the slender branchlets and calyx; flowers sessile; calyx-lobes narrow-oblong, obtuse, 1½″ long, exceeding the sub-hemispherical tube; corolla 4½–5″ long, white with a greenish margin, pubescent within toward the base, the short ovate lobes recurved; anthers cordate-globular; filaments glabrous.—W. Texas, (1609 Wright.)

5. L. PALMERI, Gray. *Proc. Amer. Acad.* 8. 292. Subpubescent, unarmed (?); branches slender; leaves narrow-spatulate, 6–8″ long; flowers rather shortly pedicelled, tetramerous; calyx-lobes lanceolate, obtusish, slightly exceeding the campanulate tube, at least one lobe a little the larger; corolla 5″ long, a third longer than the calyx, the limb ½′ wide, the broadly oval lobes puberulent-ciliolate, a little shorter than the tube; anthers oblong; filaments very woolly at base.—Sonora, (Palmer.)

6. L. COOPERI, Gray. *Proc. Amer. Acad.* 7. 388. Stems 2° high, branches stout; spines very short; leaves viscid-puberulent, spatulate, retuse, rather rigid, few-veined, 6–9″ long with the petiole; calyx cylindric-campanulate, abruptly contracted into a pedicel of equal length, (3–4″,) viscid-pubescent, the oblong obtuse lobes equaling the tube and half-shorter than the funnelform (6″ long) corolla; corolla-lobes ovate, very much shorter than the tube; anthers oval, minutely mucronate; filaments hairy at base.—S. California.

* * Calyx strongly 4–5-toothed, the lanceolate teeth a little shorter than the tube; pedicels shorter than the calyx or equaling it. Glabrous or nearly so, spinescent.

7. L. BREVIPES, Benth. Lower California; little known. Calyx scarcely 1″ long, the teeth lanceolate, acute; corolla 3–5″ long.

8. L. RICHII, Gray. Leaves spatulate, 3–5″ long, minutely puberulent when young or nearly glabrous; flowers tetramerous; pedicels 1–2″ long; calyx campanulate, the broad-lanceolate acutish teeth about equaling the tube, somewhat recurved-spreading; corolla 4″ long, the tube glabrous within, twice longer than the calyx-tube and the oval naked lobes; filaments villous at base; anthers oblong.—California.

* * * Calyx with 4–5 short or very short broad teeth, sometimes 2–3-labiately cleft.

(*a.*) Subpuberulent; filaments naked or scarcely hairy at base, not exceeding the corolla.

9. L. FRÉMONTI, Gray. Leaves *spatulate*, 6–9″ long, finely puberulent, as also the pedicels and calyx; pedicels 3–7″ (*or sometimes but* 2″) long; calyx cylindric, 2–3″ long, the tube 4 times longer than the teeth; corolla *tubular*, 4½–6″ long, the tube 4 times longer than the 5 lobes, glabrous or slightly pubescent within.—S. California or S. Nevada, (Frémont:) Arizona, (Bigelow.)

10. L. ANDERSONII, Gray. *Proc. Amer. Acad.* 7. 388. Glabrous; flowers tetramerous; calyx short-campanulate, 1½″ long or less. See page 275.

(*b.*) Glabrous; filaments hairy at base; fascicles of leaves from a usually woolly base.

11. L. TORREYI, Gray. Leaves *lanceolate-spatulate*, rather thick, 6–18″ long; pedicels fascicled, 2–5″ long; flowers pentamerous; *corolla tubular-funnelform*, 5–6″ long, blue or purple, 4 times longer than the campanulate subequally *5-toothed often tomentulose-ciliate calyx*, the corolla-lobes also tomentose-ciliate.—From W. Texas *to* S. California.

12. L. BARBINODUM, Miers. Leaves linear-spatulate, 6–12″ long; pedicels 1½″ long, equaling the calyx; flowers *pentamerous*; corolla 3″ long, campanulate above the narrow tube, 2–3 times longer than the usually cleft calyx, the short lobes sparingly hairy-ciliate.—Mexico.

13. L. BERLANDIERI, Dunal. Leaves linear-spatulate or linear, narrowed at base, 4–7″ long; flowers mostly tetramerous; pedicels 1½–3″ long; corolla white, 3–3½″ long, funnelform with dilated throat, shortly 4-lobed or more deeply 4-cleft, 3–4 times exceeding the short sometimes cleft calyx; stamens and style usually exserted; berries red.—S. W. Texas, N. E. Mexico and S. Arizona.

60

14. L. PARVIFLORUM, Gray. Leaves linear-spatulate, 2–5″ long; pedicels 1–1½″ long; flowers tetramerous; calyx equally 4-toothed or 2–3-cleft; corolla 2″ long, 2–3 times exceeding the calyx, the throat dilated, and lobes half-shorter than the tube.—Arizona.

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## NYCTAGINACEÆ.

The following conspectus of the N. American genera of the order is (with some additions) essentially as given by Dr. GRAY in the *Botany of the Mexican Boundary*, pp. 172–175. The synopsis of the genus *Abronia* is the result of an examination of the collections of Drs. Gray and Torrey and Prof. Eaton.

I. MIRABILEÆ, Gray. Involucre calyx-shaped, of united bracts, 1–12-flowered. Stigma capitate, granulate.

* Fruit symmetrical, wingless; involucre 5-cleft.

1. MIRABILIS, L. Fruit smooth, not angled, scarcely or not at all ribbed, ovoid; involucre herbaceous, unchanged in fruit; stamens most usually 5.

2. OXYBAPHUS, L'Her. Fruit with 5 stout ribs, obovate or clavate; involucre enlarged in fruit, broad-rotate, scarious, reticulated; stamens most usually 3.

* * Fruit smooth, sometimes furrowed, with winged rigid mostly dentate inflexed margins, with a double line of stipitate tubercles between; involucre 3-parted, 3-flowered, not scarious-dilated in fruit.

3. ALLIONIA, L. The only species, A. INCARNATA, L., is found in W. Texas and westward along the Mexican boundary to S. California; also in Peru. Involucral leaves ovate, concave, scarcely united at base; calyx campanulate-funnelform, mostly 4-lobed, the lobes notched; stamens usually 3, included; fruit oval.

II. ABRONIEÆ, Gray. Involucre perfect, of 5–15 distinct bracts, subtending a many-flowered head. Stigma capitate or linear-clavate.

4. NYCTAGINIA, Chois. Calyx tubular-funnelform with entire lobes; stamens and style long-exserted; fruit nut-like, as in *Mirabilis*, without ribs.—The only species, N. CAPITATA, Chois., occurs in W. Texas and N. E. Mexico. Pubescent; leaves triangular-acuminate, undulate, attenuate into the petiole; involucre of 8–12 linear-lanceolate very acute leaflets, 4–6″ long; calyx villous, red, 1′ long, the limb 5-plicate.

5. ABRONIA, Juss. Calyx salverform with obcordate lobes; stamens and style included; the perfect fruit 5-winged; embryo by abortion monocotyledonous.

III. ACLEISANTHEÆ, Gray. Involucre imperfect, of 2–3 small bractlets to each flower, or none; stigma smooth, peltate or cap-shaped.

6. SELINOCARPUS, Gray. Fruit with 5, or by abortion 3, veinless wings.—Three species, occurring in S. New Mexico and the valley of the Rio Grande, viz:—

S. DIFFUSUS, Gray. Scabrous and subviscid; stems much-branched, depressed or spreading-diffuse; leaves ovate or ovate-oblong; flowers usually in pairs, subsessile; calyx-tube 1¼′ long; stamens 5.

S. CHENOPODIOIDES, Gray. Grayish pulverulent, erect; leaves broadly ovate or subcordate; flowers cymulose-fascicled, pedicelled, small; calyx short cup-shaped, the tube nearly none; stamens 2.

S. ANGUSTIFOLIUS, Gray. Subviscid-puberulent; stems slender, 6–10′ high; leaves narrow-elliptic; flowers solitary, at length pendent; calyx funnelform, tube 1–2″ long; stamens 5.

7. ACLEISANTHES, Gray. Fruit and calyx (long-tubular) as in *Mirabilis*.—Four species, occurring in W. Texas and adjoining Mexico, viz:—

A. CRASSIFOLIA, Gray. Scabrous-puberulent, decumbent; leaves thick, ovate, rounded at base; calyx-tube 1½–2′ long, the limb 6″; fruit ovoid, scarcely costate.

A. LONGIFOLIA, Gray. Glabrous, divaricately branched; leaves deltoid-ovate or rhomboid-lanceolate; calyx-tube 5–6′ long; fruit cylindrical, 5-angled.

A. BERLANDIERI, Gray. Glabrous, diffuse; leaves cordate, reniform or ovate; calyx 1–2′ long, the tube 2–3 times longer than the limb.

A. ANISOPHYLLA, Gray. Nearly glabrous, prostrate; leaves oval or ovate, oblique at base, very unequally paired; calyx-tube 1½–2′ long, many times the limb; fruit 10-costate, 2″ long.

8. PENTACHROPHYS, Gray. Fruit cylindrical, 5-ribbed, the ribs glandular and usually thickened toward the summit.—The only species, P. WRIGHTII, Gray, is found in W. Texas and adjoining Mexico. Slender tube of the calyx 1½′ long; stamens exserted; fruit 3–4″ long.

9. BOERHAAVIA, L. Fruit with 5, or sometimes 10, ribs or angles; flowers usually panicled or racemose.—About a dozen species occur upon both sides of the Mexican boundary from W. Texas to Arizona.

10. PISONIA, L. Flowers diœcious, cymose-corymbed or umbeled; calyx of the staminate flower campanulate, of the pistillate flower cylindrical; fruit terete or ribbed, smooth or glandular. Trees or shrubs.—Two species common from the West Indies to Brazil are found in S. Florida; P. ACULEATA, L., spiny, with alternate leaves and clavate glandular fruit, and P. OBTUSATA, Sw., spineless, with opposite leaves and oblong glandless fruit.

IV. BOUGAINVILLEÆ, Chois. Involucre bract-like, large, dilated.

11. HERMIDIUM, S. Watson. Flowers approximate in a head-like cluster, each pedicel adnate to the midvein of the cordate colored bract; flower and fruit nearly as in *Mirabilis*. See page 286.

## MIRABILIS.

§ 1. NYCTAGE, Royen. Involucre 1-flowered. Calyx long-tubular or funnelform. Flowers large.

1. M. JALAPA, L. Cultivated.

2. M. LONGIFLORA, L. Viscid-pubescent, diffuse; flowers sessile, clustered: involucral-lobes linear; calyx-tube very long.—W. Texas to S. Arizona and Northern Mexico.

§ 2. QUAMOCLIDION, Chois. Nearly as the last, but the involucre 3–12-flowered.

3. M. TRIFLORA, Benth. Involucre villous, 3″ long; calyx 6–12″ long.—Mexico.

4. M. MULTIFLORA, Gray. Involucre glabrous, campanulate, 1′ long, 5-cleft; calyx 2′ long; stamens 4–5.—S. California to New Mexico.

§ 3. OXYBAPHOIDES, Gray. Involucre 1–3-flowered. Calyx broad-funnelform from a short tube; flowers rather small.

5. M. OXYBAPHOIDES, Gray. Involucre 3-flowered, 5-parted; stamens 3.—W. Mexico.

6. M. CALIFORNICA, Gray. Involucre 1-flowered, 5-cleft; stamens mostly 5. See page 284.

## OXYBAPHUS.

§ 1. Calyx short, subcampanulate or rotate-funnelform, slightly exceeding the involucre.

* Fruit glabrous, usually tuberculate along the ribs and sometimes between them; involucre 1–3-flowered.

1. O. VISCOSUS, L'Her.—Mexico.

2. O. GLABRIFOLIUS, Vahl. Flowers in crowded clusters terminating the branches.—Mexico. A variety with 2–3-flowered involucre occurs in W. Texas.

3. O. AGGREGATUS, Vahl. Peduncles solitary, axillary, villous, somewhat nodding.—W. Texas and Mexico.

* * Fruit pubescent; involucre always 3–5-flowered.

4. O. NYCTAGINEUS, Sweet. Leaves all petioled, (except the uppermost reduced ones.) obtuse or cordate at base; fruit rather hirsute, sometimes subreticulate-rugose between the ribs.—Variable. Wisconsin and the Upper Missouri to Texas and New Mexico.

5. O. ALBIDUS, Sweet. Nearly glabrous except the inflorescence; leaves all subsessile, lanceolate or oblong-lanceolate, acute at base; fruit more hirsute, muriculate along or between the ribs.—N. Carolina to Texas.

6. O. HIRSUTUS, Sweet. 1° high, hirsute throughout; leaves lanceolate, thick, the lower short-petioled; fruit of *O. nyctagineus*.—From the Saskatchewan to W. Texas.

7. O. ANGUSTIFOLIUS, Sweet. 1–6″ high, glabrous except the peduncles and involucres; leaves linear; fruit pubescent. See page 284.

§ 2. Calyx more narrowly funnelform, several times exceeding the involucre; fruit clavate-oblong, apiculate, pubescent, deeply sulcate between the stout ribs.

8. O. COCCINEUS, Torr. Resembling the last. New Mexico; N. Sonora.

9. O. FROEBELII, Behr. *Trans. Calif. Acad.* 1. 69. Scarious; leaves cordate; involucre 5-flowered; stamens 5; fruit undescribed.—A doubtful species. S. California.

## ABRONIA

Most of the species of this genus have been but imperfectly characterized and are not always readily determinable from dried specimens, especially if without fruit. They seem to be distinguishable as follows.

§ 1. Fruit coriaceous, without a rigid body, the cavity extending through the entire wing; wings truncate or abruptly attenuate above.

1. A. ARENARIA, Menz. Root perennial; stems procumbent; leaves very thick, subcordate-rounded or reniform, on thick petioles; involucral leaflets rounded or ovate, herbaceous, 2–4″ long; flowers orange-yellow, fragrant; wings rather short, (1–2″ broad,) coarsely reticulate.—On the sea-coast from S. California to Puget Sound.

2. A. FRAGRANS, Nutt. Root perennial: stems ascending; leaves oblong or ovate; involucre conspicuous, of broad ovate scarious leaflets; flowers white; fruit nearly as in the last. See page 284.

3. A. TURBINATA, Torr. Resembling the last, but annual; stems decumbent or ascending; leaves broadly ovate or oblong; involucral leaflets mostly narrow-lanceolate, subherbaceous; flowers pink; wings of regularly formed fruit horizontally crested at the apex, narrow. See page 285, and Plate XXXI.

§ 2. Body of the fruit more rigid or ligneous, the wings consisting of a single lamina.

* Wings more or less attenuate above and terminating below the apex of the fruit, cross-veined.

4. A. UMBELLATA, Lam. Annual; stems decumbent; leaves oblong or ovate, attenuate at base into a slender petiole; involucral leaflets small, lanceolate, subherbaceous, 2–3″ long; flowers pink; fruit mostly rigid-coriaceous, the wings often broad-rounded, submembranous.—From S. California to Washington Territory, confined principally to the sea-coast. Collected by Dr. Palmer in S. Utah. See Plate XXXI.

5. A. MELLIFERA, Dougl. Leaves ovate or oblong, rounded or truncate at base; involucral leaflets oblong-lanceolate, white and scarious, 3–6″ long; flowers white; fruit with the wings laterally elongated and narrowed, 3–4″ long.—Closely resembling the last. Oregon and Washington Territory, in the interior.

* * Wings orbicular and encircling the body, membranous and strongly reticulated.

6. A. CYCLOPTERA, Gray. Annual; stems ascending; leaves oblong or ovate, more or less cuneate at base; involucral leaflets ovate or narrow-lanceolate, 2–5″ long; fruit 6–12″ in diameter; seed 2½–4″ long. See page 285.

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## ERIOGONEÆ.

Condensed from the recent "Revision of the Eriogoneæ," by Drs. Torrey and Gray, in *Proc. Amer. Acad.*, Vol. VIII., pp. 145–200, (1870.)

Tribe I. EUERIOGONEÆ. Involucre remaining unchanged, nearly always calyx-like, rarely none. Leaves entire.

* Involucre represented by the 3–4 outer empty rounded bracts surrounding the head of short-pedicelled bracted flowers.

1. NEMACAULIS, Nutt. A single species, N. NUTTALLII, Benth., of S. California; annual; leaves radical and woolly; bracts also woolly within.

* * Involucre gamophyllous; perigonium usually corolla-like.

2. ERIOGONUM, Michx. Involucre many–few-flowered, its lobes pointless; pedicels exserted, jointed to the flower, with slight bractlets at the base; achenium triangular.

3. OXYTHECA, Nutt. As in the last, but the 4 involucral lobes awned, its tube naked; achenium lenticular.—Three species, all occurring in Nevada. See pages 310, 311.

4. CENTROSTEGIA, Gray. Involucre 1–3-flowered, 3–6-spurred near the base.—Two species, of S. California; low nearly glabrous annuals; C. THURBERI, Gray, having an involucre with 5 ovate teeth and 3 conical spurs, and C. LEPTOCERAS, Gray, with a narrowly 6-cleft involucre and 6 bristle-like spurs.

5. CHORIZANTHE, R. Br. Involucre 1-flowered, unappendaged; flower mostly included; pedicel jointed, usually short or almost wanting.

* * * Involucre none.

6. LASTARRIÆA, Remy. Perigonium subcoriaceous and resembling the involucre of *Chorizanthe;* stamens inserted at the throat.—A single Chilian species, L. CHILENSIS, Remy, introduced into California.

Tribe II. PTEROSTEGIEÆ. Involucre of a single 2-lobed bract embracing the solitary flower, becoming dilated and reticulated in fruit and 2-gibbous-saccate on the back.

7. PTEROSTEGIA, F. & M. Two species of Southern and Lower California, annuals, with opposite more or less lobed and sometimes toothed leaves;—P. DRYMARIOIDES, F. & M., with the fruiting involucre 1–1½″ long, dentate on the margin; and P. MACROPTERA, Benth., with the involucre ½′ long, sinuate-margined.

## ERIOGONUM.

§ 1. ALATA, Benth. Achenium 3-winged; embryo in the axis, straight or nearly so; calyx 6-parted, not produced at base. Perennials or biennials, the scapelike stems 1–3° high; involucres mostly long-peduncled, loosely cymose-panicled; leaves radical, spatulate or lanceolate; pubescence loose.

1. E. HIERACIFOLIUM, Benth. Cinereous-pubescent, the leaves subtomentose and somewhat silky-villous; flowers more or less pubescent, with the filaments and ovary subhirsute, yellow, (or rose-color;) panicle many-flowered; achenium winged only above the middle.—W. Texas.

2. E. ALATUM, Torr. Tall, more or less hirsute-villous; panicle decompound; flowers glabrous, small, yellowish; invoulcres numerous, 5-toothed; achenium winged nearly to the base, wings rather broad, thin.—From the Platte to W. Texas and New Mexico.

3. E. ATRORUBENS, Eng. Leaves villous-pubescent; scape more or less inflated, dichotomously divided into a loose cyme; involucres few, long-peduncled, 5–7-toothed; flowers glabrous, reddish; wings as long as the achenium, narrow and thickened.—Chihuahua.

§ 2. ERIANTHA, Benth. Achenium wingless, (as in all the remaining sections;) embryo straight, axile, the radicle shorter than the broad cotyledons; flowers villous or silky, with a narrow elongated base. Perennials, with branching leafy stems, alternate or verticillate leaves, tomentose beneath, and solitary mostly sessile involucres.

* Leaves alternate, narrow; panicle open, naked; calyx herbaceous, the lobes alike.

4. E. LONGIFOLIUM, Nutt. Tall, 2–4° high; lower involucres more or less peduncled.—Florida, Arkansas and Texas.

* * Leaves in whorls of 3–5, oval or oblong; cyme dichotomous, leafy; involucres sessile, many-flowered; calyx white and somewhat corolla-like, inner lobes often the longer.

5. E. TOMENTOSUM, Mx. Tall, herbaceous, very leafy; leaves obovate or oval, flat, tomentum colored; calyx tomentose, the tube elongated, lobes broadly ovate.—South Carolina to Florida.

6. E. UNDULATUM, Benth. Low and woody; leaves undulate; flowers smaller.—Mexico.

7. E. JAMESII, Benth. Low, woody at base; cauline leaves few, spatulate or oblong, tomentum white; calyx villous-silky, with obovate or spatulate lobes.—From the Platte to W. Texas and New Mexico.

§ 3. UMBELLATA, Benth. Flowers as in § 2; involucres many-flowered, solitary or rarely capitate, or in simple or compound terminal umbels; ovary usually sparingly hirsute above; embryo nearly straight, equaling or exceeding the more or less eccentric cotyledons.—Perennials, mostly low, sometimes woody; leaves usually white-woolly and mostly spatulate; flowers nearly always yellow.

* Calyx villous or pubescent externally, (except in *E. Kellogii.*)

(*a.*) Involucre campanulate, repand-dentate with 5–7 teeth; umbel usually many-rayed with an involucre of as many (2–8) about equal leaves; embryo straight.

8. E. FLAVUM, Nutt. Silky-woolly; scapes 3–6′ high; leaves spatulate or lance-oblong or subovate, crowded; calyx yellow, silky-villous, 3″ long.—From the Saskatchewan to W. Kansas and Colorado; Oregon.

(*b.*) Involucre lobed, solitary, naked, or sometimes 2–3 together in an imperfect 2–3-rayed umbel or head; embryo eccentric, often incurved. The first species with small leaves and a top-shaped involucre with broad scarcely spreading teeth, the remainder larger-leaved and the deeply 6–8-cleft involucre with narrow and at length reflexed lobes.

9. E. THYMOIDES, Benth. Woody, cæspitose, cinereous-tomentose, the numerous branches very leafy at base, a span high; leaves 2–3″ long, margin revolute; the peduncle with a whorl below the middle; calyx densely retrorse-villous at base.—Washington Territory.

10. E. CÆSPITOSUM, Nutt. Acaulescent, the leafless scapes 1–4′ high; involucres solitary. See page 298.

11. E. DOUGLASII, Benth. Densely white-woolly, woody at base and depressed cæspitose with numerous branches and rosulate leaves, the scapelike peduncle with a medial whorl of leaves and 1–3 ebracteate terminal involucres; flowers 4″ long, numerous, with broad-obovate lobes.—Washington Territory, (Douglas.)

12. E. KELLOGII, Gray. *Proc. Amer. Acad.* 8. 293. Broadly matted-cæspitose with filiform substoloniferous branches; leaves rosulate, 3–4″ long, silky-hoary; scape 3′ high, with a medial whorl of 3–4 leaves, and a solitary terminal involucre; flowers fewer, yellow or pinkish, glabrous externally, 2–3″ long on a slender stipelike base, lobes oval or obovate.—Red Mountain, California, (Kellogg.)

13. E. SPHÆROCEPHALUM, Dougl. Caulescent; branches leafy, many-flowered, with short pedicels. See page 299.

* * **Calyx glabrous externally, with a slender stipelike base.**

**(*a.*) Wholly glabrous, excepting the villous base of the filaments.**

14. E. TORREYANUM, Gray. Leaves mostly crowded on the caudex; stems rather stout, a span or more high, naked or with a single leaf in the middle, bearing a usually simple 3–4-rayed umbel subtended by a whorl of smaller leaves; flowers yellow, very numerous in the 7–8-cleft involucre, 4–4½″ long, with a short base, lobes spatulate-obovate.—Near Donner Pass, California, (Torrey.)

(*b.*) Woolly, tomentose or webby, or at length glabrate; filaments villous at base; involucre usually deeply 5–9-cleft, with spreading or reflexed lobes and numerous middle-sized flowers. The first species has the stems ascending, more or less leafy and branched; in the rest the scapelike peduncles rise from a prostrate or decumbent caudex, and are simple, leafless or with usually but a single whorl of leaves, and bearing a simple or compound umbel, rarely reduced to a solitary involucre.

15. E. POLYANTHUM, Benth. Leaves mostly verticillate, ovate or oblong, acute, white-woolly; peduncles solitary or few and umbellate; flowers yellow; embryo straight.—California.

16. E. COMPOSITUM, Dougl. Scape usually stout, 1½° high, naked, fistulous, with a compound many-rayed umbel, involucrate with linear or lanceolate bracts; involucre about 5-cleft; flowers whitish; radical leaves oblong-ovate and cordate, densely tomentose beneath.—N. California to Washington Territory.

17. E. HERACLEOIDES, Nutt. More slender; scape with a simple or compound umbel and usually a medial whorl of leaves; flowers yellowish, on a very slender stipe; leaves spatulate-oblong or oblanceolate. See page 299.

18. E. UMBELLATUM, Torr. Scape 4–12′ high, naked except the verticillate bracts; umbel simple, rarely subcompound, or sometimes reduced to 1–few capitate involucres; leaves obovate-spatulate or oval. See page 300.

(*c.*) With the habit and inflorescence of the last species; scapes very slender, 1–10′ high, leafless, bearing a simple small-bracted umbel; central involucre sessile; flowers smaller and less numerous in the 5–7-toothed involucre, on a short base, subdiœcious, the sterile umbel contracted and capitate; filaments pubescent at base.

19. E. MARIFOLIUM, T. & G. Loosely cæspitose, with the habit of *E. umbellatum;* leaves 3–5″ long, ovate, rounded at base or abruptly narrowed into a longer petiole, white-tomentose or above glabrate; flowers dull-yellow or pinkish; seed lanceolate; cotyledons ovate-oblong, exceeding the radicle.—California.

20. E. INCANUM, T. & G. More densely cæspitose; leaves very numerous, oblong or spatulate, narrowed into a petiole not exceeding the ½′ long blade, hoary-tomentose both sides; flowers bright-yellow; seed ovate-acuminate; cotyledons oval-rounded, equaling the radicle.—California.

§ 4. PSEUDO-UMBELLATA, T. & G. Base of the flower very short, abruptly contracted; involucres umbeled, very rarely solitary, many-flowered; umbel leafy-bracted, terminating a naked or 1-leaved scape; calyx 6-parted, with obovate equal segments, whitish or only yellowish, 2–3″ long; ovary glabrous, or in the first species loosely villous above the middle. Low cæspitose perennials, with crowded leaves.

21. E. PYROLÆFOLIUM, Hook. Glabrate, (or villous-woolly and tomentose in Var. CORYPHÆUM;) leaves obovate or broad-spatulate, (or ovate;) umbel 2-bracted, of 3–5 very short rays; involucre campanulate, villous; calyx slightly villous at base.—Mt. Shasta and Washington Territory.

22. E. ANDROSACEUM, Benth. Leaves oblanceolate or spatulate, white-woolly beneath, glabrate above; scape 2–3′ high, rarely 1-leaved; umbel 4–7-rayed, simple or subcapitate, with a whorl of linear bracts; involucre oblong-campanulate, 5-toothed; calyx pubescent at base; filaments nearly glabrous; radicle accumbent upon the shorter rounded very eccentric cotyledons.—Rocky Mts. of British America.

23. E. Lobbii, T. & G. Leaves subrounded; umbel somewhat compound, dense; bracts obovate or lanceolate; calyx glabrous. See page 300.

§ 5. LACHNOGYNA, T. & G. Calyx with the broad base not at all produced, woolly, 6-parted, segments oblong and equal; ovary exceedingly tomentose; filaments hairy at base; involucres few, capitate, or in a few subcymose heads, or solitary, short, 3–5-toothed.—Hoary cæspitose perennials; leaves narrow, very crowded; scape naked or almost none; flowers small, yellow.

24. E. acaule, Nutt. Matted cæspitose, nearly scapeless; involucres 1–5, subsessile; leaves linear-oblong, sessile. See page 300.

25. E. lachnogynum, Torr. Branches of the caudex very short and crowded; scape a span to 1° high, slender; leaves lanceolate or lance-oblong, 1′ long, acute, petioled, more or less revolutely margined, silky above, tomentose beneath; calyx silky-woolly, yellow within; embryo strongly eccentric.—S. Colorado and New Mexico.

§ 6. HETEROSEPALA, T. & G. As in all the remaining sections, the flower with the usually broad base not at all produced, the ovary glabrous or nearly so, the embryo incurved, and the ascending radicle much exceeding the usually rounded accumbent cotyledons; involucres capitate or umbellate-cymose on a simple naked scape, 5–8-toothed; calyx glabrous, petaloid, 6-parted, the outer segments enlarged and rounded, at length cordate and auricled at base, the inner narrow, spatulate, emarginate and connivent, each with 3 stamens on the clawlike base; filaments villous at base. Cæspitose-acaulescent white-woolly perennials; leaves oval or rounded, petioled, crowded; bracts very small.

26. E. proliferum, T. & G. Umbel proliferous-compound, with the central involucres sessile; outer segments of the rose-colored calyx becoming but slightly cordate at base.—Idaho and Washington Territory.

27. E. ovalifolium, Nutt. Involucres few in simple heads; outer calycine segments usually deeply cordate at base. See page 301.

§ 7. CAPITATA, T. & G. Involucres sessile, capitate; the usually naked globose heads solitary or subumbellate upon a naked simple peduncle; calyx mostly glabrous, the segments similar. White-woolly perennials.

* Low, cæspitose, acaulescent; head solitary; involucres few, 5–7-toothed; flowers not very numerous; bractlets slightly barbellate.

28. E. Kingii, T. & G. Loosely woolly; leaves spatulate or rounded, or sometimes sublanceolate; calyx-segments obovate-subcuneate, emarginate. See page 301.

29. E. multiceps, Nees. Very white with appressed wool; branches of the caudex ascending, leafy; leaves oblong-spatulate or oblanceolate, long-attenuate at base; scape 3–5′ high; involucres 5–10, tubular, 5-toothed, shorter than some of the bracts; calyx white or yellowish, somewhat woolly, lobes obovate-cuneate, retuse.—S. Wyoming.

30. E. pauciflorum, Pursh. Becoming glabrous; branches of the caudex very short and crowded; leaves linear or subspatulate, revolute-margined; involucres 5–10, turbinate-campanulate, 5-toothed; calyx white, glabrous, lobes oval; filaments pubescent below.—Nebraska; Colorado.

* * Taller, subacaulescent; heads solitary or few and umbeled upon the stout naked peduncle; involucres short-campanulate, truncate, very many-flowered, the 5–8 teeth united by a membrane; calyx white, glabrous, lobes broad; bractlets very villous-plumose, at length exserted.

31. E. latifolium, Sm. 1–2° high, the webby wool more or less deciduous; leaves 1–2′ long, oval, base broad and rounded or cordate; involucres 5–12, woolly, 5-toothed, the head sometimes 1′ broad; calyx-lobes broad-ovate.—Coast of California.

32. E. oblongifolium, Benth. More slender, ½–1° high; leaves oblong and oval, base usually acute; involucres glabrate, 6–8-toothed; calyx-segments oblong-obovate.—Coast of California.

§ 8. CAPITELLATA, T. & G. Involucres truncate, subdentate, many-flowered, usually by threes or twos in small heads upon a tall naked sometimes fistulous scape, those in the forks solitary; calyx 6-parted, the nearly equal lobes obovate-oblong; bractlets plumose. Acaulescent perennials; scape and involucres glabrate or glabrous; leaves broad, usually undulate; flowers white.

33. E. nudum, Dougl. Leaves hoary-tomentose beneath, ovate or obovate, usually subcordate at base and long-petioled; panicle dichotomous with long branches; involucres cylindric-campanulate, 6–8-toothed, those in the forks sessile.—Very variable. Oregon and California.

34. E. elatum, Dougl. Leaves villous-pubescent, narrower, usually attenuate at base; involucres more top-shaped, 5-toothed, pedicelled in the forks, the rest subglomerate. See page 302.

§ 9. FASCICULATA, Benth. Involucres truncate, subdentate, very many-flowered, in small bracte-

ate heads terminating the dichotomous or cymose-umbellate peduncles, the alar (or apparently lateral) ones sessile; bractlets plumose. Shrubby, leafy; leaves small, alternate and fascicled in the axils, hoary beneath, usually revolute-margined; flowers white or pinkish.—Coast of California, mostly southern.

35. E. CINEREUM, Benth. 3–5° high, loosely branched, puberulent; leaves orbicular to ovate, ½–1′ long, undulate, short-petioled, but little fascicled; flowers not very numerous, silky-villous; peduncles elongated, nearly naked, dichotomous; heads few; radicle slightly inflexed; cotyledons oval.

36. E. PARVIFOLIUM, Sm. At first webby-woolly; leaves small, very numerous upon the branches, ovate or ovate-lanceolate, undulate, with an abrupt or obtuse base; peduncles di-trichotomous; flowers glabrous, very numerous, the involucres often subracemose along the lengthened axis.

37. E. FASCICULATUM, Benth. Leaves numerous, oblong-linear or linear-spatulate, strongly revolute; peduncles slender, naked, usually umbellately divided into 3–6 rays; flowers glabrous or puberulent, very numerous.—Variable. See page 302.

§ 10. CORYMBOSA, Benth. Involucres many-flowered, 5–6-toothed, cymose by the repeated umbellate and 2–3-chotomous subdivision of the summit of the naked peduncle, the pedicels short or none; calyx glabrous, 6-parted, the inner segments usually smaller, leaves mostly narrow and at or near the base of the stems alternate, more or less white-woolly, not cordate.

* Shrubs, or the stems sometimes short and but little woody; calyx glabrous within, the segments nearly alike; ovary often scabrous above on the angles.

(*a*.) Branches woody, erect or ascending, leafy, terminated by the cyme-bearing peduncle; calyx white or pink, rarely yellow, often a little thickened at base, lobes obovate, at least the inner ones emarginate or retuse.

38. E. ERICÆFOLIUM, T. & G. Depressed, very much branched and very leafy; leaves very numerous on the branchlets, 2″ long, subulate-linear and teretely revolute, glabrous above, white-woolly beneath; cyme scarcely exceeding the leaves, of 3–7-crowded somewhat tomentose pentagonal involucres; calyx white, 1¼″ long.—Arizona.

39. E. CORYMBOSUM, Benth. 1½–2° high, floccose-woolly; branches leafy; leaves oblong; cyme broadly corymbose, many-flowered. See page 303.

40. E. MICROTHECUM, Nutt. Low, rarely 1° high, much branched from the base, more or less floccose-tomentose; leaves oblong to linear; cyme crowded or open.—Very variable. See page 303.

(*b*.) Branches leafy, less woody, very short or cæspitose-depressed; peduncle terminal, naked, elongated, herbaceous, and with the 5-toothed involucre glabrous or glabrate; calyx-segments nearly equal; leaves narrow, attenuate into a slender petiole.

41. E. BREVICAULE, Nutt. Low; leaves much crowded on the caudex-like branches; scapes rigid; flowers often yellow. See page 304.

42. E. LONCHOPHYLLUM, T. & G. Taller and scarcely woody at the leafy base; leaves not much crowded, lanceolate or broad-linear, white-woolly beneath; cyme repeatedly trichotomous and panicle-like; lower bracts filiform, the upper subulate; flowers white, with obovate retuse segments.—New Mexico.

* * Annual; stems loosely branched, leafy only below; calyx pink, glabrous within, the segments obovate and nearly equal; bractlets scarcely bearded.

43. E. TRUNCATUM, T. & G. Loosely floccose-woolly, 1° high; leaves subfascicled, spatulate or oblong, 1½′ long with the slender petiole; peduncles long, naked; cyme loose, di-trichotomous; involucres rather few, many-flowered, 2″ long, oblong-campanulate, truncate; bracts very small.—Mt. Diablo, (Brewer.)

* * * Annual, white-woolly; stems tall, strict, leafy; cyme decompound, many-flowered; calyx white, webbed within at base with long wool, the outer segments much the larger; bractlets finely plumose.

44. E. ANNUUM, Nutt. Leaves oblong, attenuate at base, mostly petioled; involucres woolly, glabrous within, shortly 5-toothed; outer calyx-segments broadly obovate, the inner oblong.—From Nebraska to Arkansas, Texas, New Mexico and Chihuahua.

45. E. MULTIFLORUM, Benth. Leaves oblong and lanceolate, undulate, the cauline sessile, obtuse or auricled at base; involucres 5-lobed, often glabrate, webbed within; outer calyx-segments rounded oval, becoming deeply cordate, the inner nearly linear.—Arkansas to Louisiana and Texas.

§ 11. VIRGATA, Benth. Involucres sessile along one side of the usually virgate branches of the panicle, mostly small or narrow; calyx 6-parted, usually glabrous.

* Perennial, a few shrubby at base, woolly; flowers white or pinkish, glabrous, many in the involucre.

(*a.*) Calyx broad and truncate below, having the broad-oval outer segments distinct and subauriculate-rounded at base; panicle often dichotomous and bracts somewhat leafy; white-woolly.

46. E. NIVEUM, Dougl. Woody at base, 1° high or more, densely tomentose; stems leafy below or nearly naked; leaves ovate or oblong, petioled; the bracts and the 3–4 subulate teeth of the densely woolly involucre recurved-spreading; outer calyx-segments becoming rounded-oval and slightly cordate, enclosing the obovate-spatulate inner ones.—Oregon and Washington Territory.

47. E. DICHOTOMUM, Dougl. Somewhat like the last; branches short and densely leafy, with strict scape-like rarely leafy peduncles; leaves oblong, attenuate at base; bracts appressed, shorter than the involucre; involucre-teeth 3-5, shortish and obtuse, subequal; outer calyx-segments obovate-oval.—Oregon and S. Idaho.

(*b.*) Calyx acute at base, the segments alike; the first two species scapose and strict, the last caulescent and diffusely panicled.

48. E. STRICTUM, Benth. Cæspitosely much-branched at base; leaves crowded, spatulate or obovate-oblong, white-woolly beneath, attenuate into a long petiole; scapes very slender, 1° high, glabrous or glabrate, 2–3-chotomously branched; bracts small, subulate, appressed; involucre 1″ long, glabrate, campanulate, equally 5-toothed; calyx-segments oval or oblong.—Oregon. (Douglas.)

49. E. RACEMOSUM, Nutt. Leaves ovate or oblong, long-petioled, abrupt or subcordate at base; scape stout, 1–2° high; involucres spicate along the few rigid branches. See page 304.

50. E. WRIGHTII, Torr. Branched from a shrubby base, leafy below; leaves narrow at base, often fascicled; involucres loosely spicate; ovary slightly scabrous above. See page 305.

* * Annual, (excepting perhaps *E. elongatum*;) flowers small, white or rose-color, acute or acutish at base, mostly glabrous; bracts small, appressed.

(*a.*) Involucre tubular, 3½–2″ long, many-flowered, hoary-woolly, scattered upon the virgate mostly simple branches, appressed; calyx-segments obovate, nearly equal. White-woolly plants, the at length floccose tomentum rarely deciduous. Californian.

51. E. ELONGATUM, Benth. Stems or branches 1½–3° high, sparingly leafy at base only; leaves oblong-lanceolate; involucres 3″ long, rather many-flowered, spicate and distant along the simple branches, repand-truncate; ovary glabrous; embryo 1″ long or more.

52. E. VIRGATUM, Benth. Stem more slender, sparingly leafy at the base or also above; branches few, simple, sometimes paniculately branched; leaves ovate or oblong; involucres 2–2½″ long, 5-toothed; ovary and abruptly rostrate achenium a little scabrous above; embryo ½″ long.

(*b.*) Involucre narrow-tubular, few to rather many-flowered, 2″ long or less, scattered on the slender branchlets of the diffuse panicle, longer than the glabrous or pilose flowers; bractlets scarcely bearded; low, finely tomentose above or glabrous, with rounded radical leaves.

53. E. DASYANTHEMUM, T. & G. Cinereous-woolly or glabrate above; involucre shortly 5-toothed, commonly hoary, fully 2″ long, sometimes 15–20-flowered; calyx finely villous, at least at base, the obovate segments nearly equal.—California.

54. E. VIMINEUM, Dougl. Involucres few-flowered and glabrous, as also the very slender branches of the more decompound panicle; calyx glabrous, inner segments narrower. See page 305.

(*c.*) Involucre few or rather many-flowered, oblong-campanulate, subturbinate, 5-toothed, 1″ long, scattered upon the slender branchlets of the usually much-branched panicle; calyx glabrous, shorter than the involucre, inner segments narrow; leaves radical or more or less cauline, white-woolly beneath, floccose-woolly above, as usually the branches and involucres.

55. E. GRACILE, Benth. Stem naked or leafy; panicle open and spreading; bractlets subglandular-barbellate; outer calyx-segments obovate, the inner oblong. See page 305.

56. E. POLYCLADON, Benth. Wool persistent; stem 2–3° high, leafy to the rather strict ample panicle; leaves oblong and obovate; bractlets villous with very long delicate hairs; calyx-segments attenuate at base, the outer fan-shaped, the inner obovate-spatulate.—W. Texas to Arizona.

(*d.*) Involucre mostly short-campanulate, small, shorter than the enlarged calyx, scattered on the usually tangled branchlets of the naked panicle, its teeth 4–5, broad, rounded; bractlets chaffy; leaves subradical, rounded, long-petioled.

57. E. HEERMANNI, Dur. & Hilg. Glabrous or glabrate; calyx glabrous, becoming 2″ long, outer segments rounded, the inner smaller, oblong-spatulate. See page 306.

58. E. PLUMATELLA, Dur. & Hilg. Floccose-woolly, low; calyx glabrous, 1″ long, the segments obovate-cuneiform, retuse. See page 306.

59. E. INTRICATUM, Benth. Leaves viscid-pubescent; the divaricately much-branched panicle and the very small few-flowered short-campanulate involucres glabrous; bractlets obovate- or cuneate-

oblong, ciliolate; calyx slightly hairy, the segments obovate, similar; ovary glabrous.—Lower California.

§ 12. PEDUNCULATA, Benth. Involucres few–many-flowered, 5-toothed, (usually long-) pedicelled, solitary upon the di- or trichotomous branches and in the forks of the leafless small-bracted loosely panicled peduncle. Mostly annuals; leaves broad, usually rounded, radical or on a short stem; inflorescence never pubescent; flowers mostly white or whitish.

* Low stemless annuals; panicle divaricately much-branched, covered with club-shaped glands; involucres few-flowered.

60. E. BRACHYPODUM, T. & G. Leaves loosely woolly; panicle rigid, nearly prostrate; pedicels not exceeding the glandular 8–12-flowered (1″ long) involucre; bractlets sublinear, hirsute-ciliate; outer calyx-segments glabrous, cordate-ovate, obtuse, twice exceeding the ovate long and obtusely acuminate inner ones.—S. E. California.

61. E. GLANDULOSUM, Nutt. Leaves slightly hairy, green; panicle slender, effuse; pedicels capillary, 2–3″ long, divaricate; involucre ½″ long, very few-flowered, glandless; calyx-segments oblong-ovate, acutish, subequal, sparingly hirsute.—Rocky Mts., (Gambel.)

* * Panicle glabrous, or the involucres and pedicels rarely very minutely glandular; annuals, (*E. tenellum* and perhaps *E. ciliatum* excepted.)

(*a.*) Pedicels of the spreading much-branched many-flowered panicle rigid, sometimes subracemosely secund, soon deflexed; involucres many-flowered, about 1″ long; calyx glabrous; beak of the achenium scabrous.

62. E. DEFLEXUM, Torr. Involucre short, exceeding the pedicels; calyx white, the outer segments rounded-cordate, the inner very small. See page 306.

63. E. NUTANS, T. & G. Pedicels viscid, 2–3 times exceeding the broad-campanulate involucre; calyx rose-colored, very obtuse at base, outer segments broad-oval, emarginate, the inner oblong, half as large. See page 307.

64. E. WATSONII, T. & G. Pedicels smooth, 2–5 times exceeding the narrow- or clavate-campanulate involucre; calyx rose-colored and white, obtuse at base, segments nearly equal, oval, slightly retuse. See page 307.

65. E. CERNUUM, Nutt. Pedicels smooth, 2–4 times longer than the campanulate involucre; calyx white or pinkish, with an acute top-shaped base, outer segments square, emarginate, the inner oblong, half as wide. See page 308.

(*b.*) Spreading, usually very much branched, mostly very slender; pedicels not deflexed; involucre 1″ long or less, few or rather many-flowered; calyx mostly very obtuse at base.

(1.) Leaves white-woolly beneath, mostly floccose above; calyx not exceeding the coarsely 5–6-toothed involucre; glabrous or slightly pilose at base; bracts usually woolly within.

(1ª.) Pedicels but 1–5″ long and with the panicle rather rigid; calyx glabrous, lobes very unequal.

66. E. ROTUNDIFOLIUM, Benth. Panicle much branched from the base, a span high; leaves soon naked above; involucres broad-campanulate; bractlets sparingly plumose; calyx white, only 6-cleft, the outer segments dilated fan-shaped, retuse, the inner narrowly oblong.—W. Texas; New Mexico.

(1ᵇ.) Pedicels slender, mostly capillary, those in the forks ½–1½′ long; cyme slender, di-trichotomous, with the scape a span high, in depauperate specimens subsimple; leaves mostly ½′ broad or less.

67. E. THURBERI, Torr. Leaves usually rugose; scape 1–2′ high; bracts in threes or fours, conspicuous and calyx-like; involucre broadly topshaped-campanulate, 10–18-flowered, often obscurely glandular; bractlets nearly wanting; calyx white, very minutely pubescent at base, 5-parted, the segments very unequal and pandurate, the outer much dilated and rounded above, finely webby in the middle, the inner small and subhastate-lanceolate.—S. California; S. Arizona.

68. E. THOMASII, Torr. Bracts at the nodes very small; involucre few-flowered, about ½″ long; bractlets chaffy, long villous on the margin; calyx white or yellowish, finely hispid at base, the segments subpandurate, equal in length, slightly dilated above, very obtuse, the outer at length subcordate at base, the inner but half as wide.—S. California; S. Arizona.

69. E. PUSILLUM, T. & G. Calyx yellow, subglandular-puberulent, the segments nearly similar, obovate. See page 308.

70. E. RENIFORME, Torr. Leaves reniform or rounded-cordate, covered with very soft dense white wool; bracts small, woolly; involucres broad-campanulate, not glandular, 8–12-flowered; calyx glabrous, white or pinkish, segments ovate, the inner slightly smaller.—California; W. Arizona. See page 308.

(2.) Leaves pubescent, sometimes glabrate, not woolly nor tomentose, long-petioled; panicle taller, upon a rather rigid often fistulous scape, the pedicels divaricate, capillary and glabrous, ½–1′ long

or more; bracts not woolly; calyx yellowish, densely hirsute, twice longer than the very small few-flowered 4–5-cleft involucre, the segments similar and nearly equal.

71. E. TRICHOPODUM, Torr. Leaves finely pubescent or glabrate, scarcely cordate; scape short; panicle very branching and slender. See page 309.

72. E. INFLATUM, Torr. Leaves rather hirsute or velvety; scape elongated, often inflated, panicle rather stout and rigid. See page 309.

(3.) Whole plant glabrous; calyx not exceeding the very long-pedicelled few-flowered involucre.

73. E. GORDONI, Benth. Leaves round; peduncles several, short, repeatedly dichotomous and loosely panicled above; pedicels erect, subcapillary, 1′ long or more; involucre scarcely 1″ long, turbinate-campanulate, 5-toothed; bractlets minutely glandular, outer calyx-segments ovate, the inner oblong, a little shorter.—On the Upper Platte, (Gordon.)

(*c.*) Perennials or biennials, less branched; leaves not cordate; bracts verysmall; pedicels elongated, erect; involucres 1½–2½″ long, rather many-flowered; calyx glabrous, with a short top-shaped base; bractlets villous.

74. E. TENELLUM, Torr. Cæspitose with a much branched woody caudex; leaves crowded, ovate or rounded, white-tomentose; scape and spreading panicle smooth; flowers fewer in the involucre, white, the segments retuse, unequal, the outer broad-obovate or rounded.—Colorado to New Mexico and W. Texas.

75. E. CILIATUM, Torr. Radical leaves rosulate, obovate-spatulate, ciliate on the margins and mid-vein, otherwise glabrous; the scape and few peduncles elongated; involucre broadly campanulate, 2″ long; calyx dark-red, thickish, 6-cleft, the lobes ovate, acute, the inner a little narrower and longer.—N. E. Mexico.

§ 13. PSEUDO-STIPULATA, Benth. Involucres and pedicels as in § *Pedunculata*, (or the alar involucres sessile in *E. divaricatum*;) stems branched, leafy; the true cauline leaves bract-like, opposite or verticillate, the axillary more developed, in pairs or fascicled; calyx very obtuse at base, minutely glandular; achenium sharply triangular.

76. E. ANGULOSUM, Benth. Annual, floccose-woolly; panicle effuse; branches angled; pedicels filiform, widely spreading; involucres many-flowered, short-toothed; flowers short-pedicelled, segments unequal. See page 309.

77. E. GREGGII, T. & G. Perennial, erect, about 1° high, puberulent, subglandular; leaves spatulate, subciliate, nearly glabrous, the true cauline ones verticillate, lanceolate, herbaceous, connate into a sheath at base; pedicels subracemose, erect, about 1″ long; involucre turbinate-campanulate, 2″ long, many-flowered, 5-toothed; bractlets scarious, hirsute; calyx purplish, deeply 6-cleft, the lobes ovate-oblong, similar.—Northern Mexico.

78. E. DIVARICATUM, Hook. Annual, low, puberulent, much branched; radical leaves ovate and spatulate, cauline stipule-like, subulate-linear, the axillary ones similar, in pairs; involucres very small, nearly 5-parted, few-flowered, those in the forks mostly sessile; calyx-segments white, oblong, subequal.—S. Wyoming, (Geyer.)

§ 14. FOLIOSA, Benth. Inflorescence as in the last section; involucre 4–8-cleft or parted, those in the forks sometimes sessile; calyx with a very short acute or obtuse base, 6-parted, the pedicel exserted; annuals, with leafy stems, the cauline leaves developed, mostly opposite or verticillate, the axillary similar and fascicled.

79. E. SALSUGINOSUM, Hook. Glabrous, diffusely much-branched, 1′ to a span high, leafy throughout; leaves spatulate or oblong or the upper linear, subfleshy; involucre of several unequal nearly distinct linear bracts, few-flowered, sessile in the forks or a few of them on filiform peduncles; calyx subherbaceous, minutely roughish, the segments oblong, subequal, closed in fruit upon the sharply triangular achenium.—Southern Wyoming.

80. E. ABERTIANUM, Torr. Villous or pubescent, paniculately branched, erect, leafy; leaves ovate or subcordate, petioled, the upper lanceolate or linear, subsessile; involucres more or less peduncled, many-flowered, with 5–8 linear leafy segments; calyx petaloid, glabrous, rose-colored, outer segments rounded, deeply cordate, becoming nearly 2″ long, the inner linear-oblong, retuse.—W. Texas to Arizona.

81. E. PHARNACEOIDES, Torr. 1° high, pubescent, very slender, effusely panicled, internodes elongated; cauline leaves narrow-linear, more or less tomentose; pedicels capillary, smooth; involucres 5–8 cleft, 8–12-flowered; calyx petaloid, glabrous, outer segments broadly ovate, bigibbous at base in fruit, the inner longer, oblong-linear, retuse; anthers dark.—New Mexico; Arizona.

82. E. SPERGULINUM, Gray. Panicle more effuse; leaves narrow-linear, sparingly hirsute and glandular; involucres on very slender pedicels, 4-cleft, 1–2-flowered; calyx-segments equal, cuneate-oblong. See page 310.

# CHORIZANTHE.

Chilian species omitted.

§ 1. EUCHORIZANTHE, T. & G. Involucre tubular, 6-toothed, 6-ribbed, usually coriaceous, the stout ribs terminating in a usually uncinate cusp or awn; stamens inserted near the base of the 6-lobed calyx; leaves never cordate, entire, at least the cauline narrow and attenuate at base. Annuals; Californian, with one exception.

* Involucres in subcapitate clusters, the limb more or less white-scarious, (occasionally wholly herbaceous.)

(*a.*) The limb, excepting the ribs, wholly petaloid-scarious, rotate-expanded, shortly 6-lobed; stem erect; head dense.

1. C. MEMBRANACEA, Benth. Webbed-woolly; leaves and bracts linear, with a weak mucro; heads solitary or few along the somewhat simple branches; involucre scarious above the base, the limb very widely dilated, the stout ribs slenderly awned.

2. C. STELLULATA, Benth. Rough-pubescent, fastigiately branched; cauline leaves nearly linear; bracts acerose, pungently awned, hirsute; heads subcymose; involucre-tube narrow, equally 6-ribbed, 2″ long, 4 times longer than the abrupt white-scarious limb; the stout ribs slenderly awned; calyx-segments obcordately 2-lobed; anthers oblong-linear.—Only from Hartweg.

3. C. DOUGLASII, Benth. Low, villous-pubescent; cauline leaves spatulate or lanceolate; bracts acerose, pungent; heads usually umbellate, globose; involucre-tube unequally angled, 2–3 times longer than the short abrupt white or pinkish limb and the subulate unequal awns; calyx-lobes truncate, subcrenulate; anthers linear-oblong.

(*b.*) Limb 5-parted, the segments scarious on the margin or wholly; stems lax, branched from the base, often diffuse; pubescence more or less villous; heads mostly irregularly panicled; bracts awned or pungent, the uppermost awn-like. A few solitary involucres often have the teeth wholly herbaceous.

4. C. DIFFUSA, Benth. Slightly pilose, slender; leaves mostly radical, spatulate or oblong-ovate; clusters small, rather loose; involucre 1″ long or less, the ovate teeth scarious excepting the midribs, 1 or 2 of the unequal awns equaling the tube; anthers oval.

5. C. PUNGENS, Benth. Softly hirsute-villous, the stems mostly spreading, branched, and leafy below; leaves spatulate or sublanceolate; clusters irregular; involucre 1½–2½″ long, the unequal ovate or ovate-subulate teeth herbaceous at base, more or less scarious-margined, the larger teeth and bracts longer awned; anthers oblong.

* * Only the sinuses of the involucre scarious, the teeth wholly herbaceous or coriaceous, often horn-shaped; involucres in crowded cymelets or clusters, (in *C. brevicornu* loosely panicled,) those in the forks solitary; stamens 9, in the last two species but 3.

(*a.*) Calyx-segments pectinate-fimbriate below the apex; erect; leaves all radical, spatulate and oval; peduncle naked, cymose with repeatedly di-trichotomous divisions; bracts acerose-subulate; flowers sessile in the involucre.

6. C. LACINIATA, Torr. Dwarf, subvillous, many-flowered; teeth of the involucre subulate-awned, nearly equal, 2-4 times shorter than the tube; calyx twice exceeding the involucre, segments triangular-lanceolate, long and densely fimbriate, tailed at the apex.—Found only by Antisell.

7. C. FIMBRIATA, Nutt. Low, subvillous or nearly glabrous; the stout subulate awned teeth a little shorter than the involucre-tube; calyx less exserted, the segments irregularly lacerate-fimbriate below the oblong obtuse apex.

(*b.*) Segments of the calyx entire or only crenulate at the apex; stems somewhat naked.

8. C. STATICOIDES, Benth. Erect, 2–12′ high; leaves mostly radical, spatulate, oblong or rounded, hirsutish, subtomentose beneath; cyme loosely corymbose; involucral teeth subulate, shortly awned, unequal, the larger 2–3 times shorter than the narrow tube.

9. C. PROCUMBENS, Nutt. Depressed and diffuse, subhirsute; leaves spatulate; cymelets irregularly panicled; teeth horn-shaped, subulate-awned and usually uncinate, the 2–4 larger ones a little shorter than the (1″ long) tube.

10. C. UNIARISTATA, T. & G. Diffuse, with a soft grayish pubescence; leaves spatulate, pilose-pubescent beneath; cymelets rather loose; bracts awned; teeth horn-shaped, one terminated with a stout straight awn longer than the short-oblong tube, the rest short-cuspidate. (Brewer.)

11. C. BREVICORNU, Torr. Leaves linear or obovate-spatulate; involucres narrow, prismatic, mostly scattered; teeth subequal, recurved; calyx-lobes entire. See page 312

§ 2. MUCRONEA, T. & G. Involucre 2–4-sided, 2–4-lobed, chartaceous-coriaceous, the lobes herbaceous, straight-awned; stamens 9, inserted at the base of the 6-parted calyx. Annuals of Southern California, paniculately much branched; involucres in the forks and scattered upon the slender branches; cauline leaves and bracts similar, amplexicaul, more or less stellately 3-lobed, cusped or awned; flower more or less pedicelled.

12. C. PERFOLIATA, Gray. Slightly hirsute and glandular or glabrous; leaves perfoliate; involucre 4-sided, the teeth shortly and unequally subulate-awned; calyx-segments laciniate above.

13. C. CALIFORNICA, Gray, More hirsute; leaves clasping, the upper deeply 3-lobed; involucre compressed, usually 2-lobed and 2-awned, rarely 3–4-sided, the additional awns shorter; calyx-lobes entire.

§ 3. ACANTHOGONUM, T. & G. Involucre 3–5-toothed or lobed, coriaceous, the tube transversely veined or ridged, the lobes unequal, immarginate; stamens 6–9, on the throat of the 6-lobed calyx, the filaments and anthers short. Dwarf annuals, with ovate or spatulate entire petioled pointless leaves, the involucres more or less clustered; flower pedicelled, slightly bracteolate.

* Involucre broadly triangular, 3-ribbed, 5-toothed; bracts unarmed.

14. C. POLYGONOIDES, T. & G. Diffusely much-branched, depressed, loosely hirsute pubescent, 3–4′ high; leaves and bracts spatulate, the uppermost sometimes mucronate; involucres rather loosely paniculate-clustered, at length hardened, the 3 lobes triangular-subulate and awned with a somewhat hooked spine, the 2 intermediate ones small; stamens 6.—California, (Rattan.)

* * Involucre triangular, 6-ribbed, trifid; bracts spiny.

15. C. RIGIDA, T. & G. Dwarf, woolly or tomentose; involucres sessile, surrounded by the elongated awn-shaped at length indurated bracts, the lobes unequal, with a straight cusp, and longer than the short tube; stamens 9. See page 312.

* * * Involucre with a narrow terete tube without ribs, the 3–5 teeth and the rather small bracts short-cuspidate. Dwarfed annuals, 1–3′ high, at length subcymosely branched.

16. C. CORRUGATA, T. & G. White-woolly; leaves ovate or round-oval; tube of the involucre nearly 2″ long, subclavate, strongly corrugated, a little shorter than the 3 ovate-lanceolate curved-pointed lobes; calyx-tube attenuate at base; stamens 6–9.—S. California.

17. C. WATSONI, T. & G. Hoary-pubescent; involucral-teeth 5, very unequal, 1–2 dilated and leafy; calyx-tube cylindric; stamens 9. See page 313.

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# ALLIUM.

A comparison of the specimens belonging to this genus in the herbariums of Dr. Gray, Dr. Torrey, and Prof. Eaton, is the basis of the following synopsis. It appears that considerable assistance in the determination of the species may be derived from the characters of the rootstock and bulb-coatings, and that the cresting of the capsule is subject to little variation, though in some species becoming somewhat obscured in the mature fruit. The comparative lengths of the style and stamens, and the size, shape and color of the segments of the perianth are usually rather less constant. The fibrous network or cellular reticulation that occurs in some or all of the outer or inner coatings of the bulbs in several of the species, (either distinguishable by the naked eye or under a simple lens, or in some species requiring a rather higher power for its satisfactory definition,) is to a very good degree constant in its characters and frequently very distinctive. Our species may be thus arranged:—

§ 1. Cells 1-ovuled. Bulb crowning an evident perennial rootstock; coatings usually fleshy; capsule not crested.

1. A. TRICOCCUM, Ait. Leaves oblong-elliptical; coatings sometimes coarsely fibrous.—N. England to Wisconsin and south to Kentucky and N. Carolina.

§ 2. Cells 2-ovuled; 0–2-seeded.

* Bulb crowning a perennial rootstock, the coatings membranous without distinguishable cross-reticulation; spathe 2–3-valved, (in *A. brevistylum* 1-valved.)

(*a.*) Capsule crested.

2. A. SCHŒNOPRASUM, L. Leaves awl-shaped, hollow; umbel capitate, the pinkish sepals exceeding the pedicels and stamens; capsule slightly crested.—Canada and the upper lakes to the Saskatchewan, Washington Territory and Alaska, (584 Geyer;) Wind River Mountains, Wyoming, (Frémont:) Walla-Walla River, Oregon, (Tolmie.)

3. A. CERNUUM, Roth. Leaves linear, keeled; scape angled, rather stout, 1–2° high; spathe-segments usually small; umbel loose, nodding; stamens and style exserted.—W. New York to N. Carolina and west to Wisconsin, the Saskatchewan and Washington Territory; Wyoming to New Mexico, (848 Fendler, 1913, 1914 Wright;) Raton Mts., (Abert;) Roubideau's Pass, (Gunnison;) Colorado, (350 Parry, 540 Hall & Harbour;) Bridger's Pass, (H. Engelmann;) Ft. Colville and Puget Sound, (Lyall, Wilkes.)

(*b.*) Capsule not crested.

4. A. VALIDUM, S. Watson. Scape stout, 1–2½° high, angled; leaves broad-linear, 3–7″ wide, elongated; spathe-segments broad and connate; umbel capitate, many-flowered, erect or rarely subnodding; sepals white or pinkish, long-acuminate, 4″ long, equaling the stamens, shorter than the style.—In the California Sierras and Nevada. See page 350.

5. A. BREVISTYLUM, S. Watson. Scape slender, 1–1½° high; leaves long-linear, 1–3″ wide; spathe 1-valved, obliquely connate-campanulate; umbel erect, few-flowered, with short pedicels; sepals bright pink, long-acuminate, 4″ long; stamens half as long, exceeding the style. See page 350.

* * Perennial, with a series of separated corm-like bulbs, rooting from the stem above; outer coats chartaceous, minutely contorted-reticulate; spathe large, 2-valved; capsule not crested.

6. A. UNIFOLIUM, Kellogg. *Proc. Calif. Acad.* 2. 112, *fig.* 35. Scape stout, 1½–2° high, terete; leaves several, long-linear, 2–4″ wide, flat; umbel erect, usually many-flowered, spreading; pedicels 1–1½′ long; sepals pink, 5–6″ long, broad, acute, exceeding the stamens and style.—California; Tamul Pass, (Bigelow;) near San Francisco, (Kellogg;) Ukiah, (Bolander.) *A. falcifolium*, Var. *β.*, of Whipple's Report. The specific name is a misnomer. The remarkable character of the bulbs and rootstock would suggest a distinct genus, but there is nothing in flower or fruit to separate it from *Allium*, and the taste is decidedly alliaceous. PLATE XXXVI. Fig. 9. Bulbs, rootstock and base of stems; natural size. Fig. 10. Reticulation of coating; magnified thirty diameters.

* * * Bulbs without evident perennial rootstocks; leaves sheathing, (solitary in *A. Nevadense;*) spathes 2- (rarely 3-) valved, (in *A. Sanbornii*, 4-valved.)

(*a.*) Capsule crested.

7. A. STELLATUM, Fras. Coatings membranous, not at all fibrous; scape slender, 1–1½° high, angled; leaves very narrowly linear, elongated; umbel 10–25-flowered, rather loose; pedicels 4–6″ long; stamens equaling the pinkish ovate-oblong acute (3″ long) sepals; style exserted; crest large.—On the Saskatchewan. Specimens from Hooker in Herb. Gray.

8. A. RETICULATUM, Fras. Coats densely fibrous; scape 6–15′ high, subterete; leaves very narrowly linear, elongated; umbel many-flowered, spreading; stamens and style shorter than the usually acute (3–4″ long) sepals; crest mostly short.—From the Saskatchewan to the Columbia and south to New Mexico. Very variable.

Var. *α.* Low, 6–8′ high; sepals 3″ long, white or slightly pinkish, acuminate.—Saskatchewan, (Douglas, Bourgeau;) Upper Missouri, (Suckley;) Spokan River, (Wilkes;) Columbia River, (Wyeth;) Colorado, (545 Hall & Harbour, 552 Vasey;) Indian Territory, (328 Palmer.) *A. angulosum*, Nutt.

Var. *β.* Taller, (10–15′,) slender; bulb less densely fibrous; sepals white or pink, 3–4″ long, acuminate and strongly carinate, sometimes but little exceeding the stamens.—Colorado to the Columbia; has been confounded with *A. stellatum*. Upper Missouri, (Nicolet;) Colorado, (546 Hall & Harbour;) Idaho, (Spalding;) Washington Territory, (Lyall, Wilkes, 226 Geyer.) A form near this, but with umbels mostly bulbiferous and coats densely fibrous, was collected in the Wahsatch and on Bear River, Utah. See page 350.

Var. *γ.* Like the last, but the pedicels rather more slender, the sepals usually more recurved, and the whole lower stem, with the bulb, thickly fibrous-coated.—New Mexico, (1915 Wright;) and Cambridge, from seed.

Var. *δ.* Low; capsule long-crested; sepals pinkish, 3–4″ long, short and narrow, or very broad and longer.—New Mexico, (1916 Wright, Bigelow, Newberry, Palmer, Dr. Seguin.)

9. A. SANBORNII, Wood. *Proc. Acad. Phil.*, 1868, *p.* 171. "Bulb ovate, white;" scape tall, slender; spathe 4-valved; flowers very numerous, on very slender (6–8″ long) spreading pedicels; sepals light pink, 3″ long, erect, shorter than the stamens and style.—N. California, (Shelton, Pratten, Wallace.) PLATE XXXVII. Fig. 7. Flower; enlarged two diameters.

10. A. ATTENUIFOLIUM, Kellogg. *Proc. Calif. Acad.* 2. 110, *fig.* 34. (*A. reticulatum*, Benth., *Pl. Hartw.* 339. *A. occidentale*, Gray, *Proc. Amer. Acad.* 7. 390. *A. acuminatum*, Var. *β. gracile*, Wood, *l. c.*) Bulb small, reddish, the coats minutely wavy-reticulated; scape slender, 10–15′ high; leaves very narrowly linear; flowers white, numerous, crowded on slender (3–6″ long) pedicels; sepals 3″ long, usually inflected, about equaling the stamens and style.—N. California; frequent. (1995 Hartweg, 396, &c., Frémont, 341 Bridges, 4942 and 6552 Bolander, Kellogg.) PLATE XXXVII. Fig. 8. Flower; enlarged two diameters. Fig. 9. Reticulation of bulb-coat; enlarged thirty diameters.

11. A. SERRATUM, S. Watson. Bulb-coats conspicuously transversely serrate-reticulate; scape usually slender, 4–12′ high; leaves very narrowly linear; umbel usually many-flowered and often large, the spreading pedicels 6–15″ long; sepals pink or crimson, 4–6″ long, usually broad and acuminate, erect or recurved, exceeding the stamens; capsule slightly crested.—Quite variable. California; frequent. (Douglas, 1991 Hartweg, 469 Frémont, 345 Bridges, Bigelow, Wallace, Stillman, Rich, Bolander, Kellogg.) *A. amplectens*, Torr, *Pac. R. R. Surv.* 4. 148, is a very young undeveloped state, and the name is inapplicable to the more matured plant. It is also the *A. falcifolium* and *A. acuminatum* of Whipple's Report, mostly. PLATE XXXVII. Fig. 4. Reticulation; enlarged thirty diameters. Fig. 5. Flower; enlarged two diameters.

12. A. BISCEPTRUM, S. Watson. Bulb frequently bulbiferous, coats membranous and minutely sinuous-reticulate; scapes usually 2 or more, rather slender, 6–12′ high; leaves linear, 2–6″ wide, flat, usually equaling or exceeding the scape; umbels many-flowered, occasionally bulbiferous; pedicels 6–10″ long, spreading; sepals white or pinkish, 3–4″ long, acute or acuminate, usually spreading; crests conspicuous.—See page 351, and Plate XXXVII.

13. A. PALMERI, S. Watson. Reticulation irregular, subquadrate, the cell-outline minutely very sinuous; scape 8′ high, rather stout; leaves narrow-linear; umbel rather many-flowered, the spreading pedicels 6″ long; sepals more or less deep rose-color, 3–4″ long, acute, erect-spreading, exceeding the stamens.—New Mexico, (Palmer, 1869.) Probably also from Ft. Defiance, (Newberry,) and Hell Cañon, (Hervey,) but the specimens are imperfect. PLATE XXXVII. Fig. 10. Flower; enlarged two diameters. Fig. 11. Reticulation; enlarged thirty diameters.

14. A. BIGELOVII, S. Watson. Coatings dark-brown, membranous, with a conspicuous vertically oblong reticulation, the cell-outline somewhat curved; scape 6′ high, stout; leaves linear, thick; umbel 25-flowered, the spreading pedicels 6–8″ long; sepals 6″ long, deep-pink, erect, exceeding the stamens; capsule strongly crested.—Cook's Springs, S. W. New Mexico, (Bigelow;) a single specimen. PLATE XXXVIII. Fig. 8. Flower; enlarged two diameters. Fig. 9. Reticulation enlarged thirty diameters.

15. A. NEVADENSE, S. Watson. Reticulation distorted; scape very low, (2–4′;) leaf solitary, long-linear, 1″ wide, exceeding the scape, falcate, much curved at the end; umbel 10–30-flowered, the spreading pedicels 3–7″ long; sepals white or pink, 4–5″ long, acute, subspreading, a little exceeding the stamens; capsule strongly crested.—Nevada and Utah; near Carson City, (23 Anderson, in part.) See page 351, and Plate XXXVIII.

16. A. ATRORUBENS, S. Watson. Sepals very deep rose-color or crimson, long-acuminate, 5″ long, spreading or recurved, the deeper-seated bulb showing no decided reticulation; otherwise as the last. See page 352, and Plate XXXVIII.

(*b*.) Capsule not crested. Leaves very narrowly linear, except in *A. Douglasii*.

17. A. CANADENSE, Kalm. Bulbs subfibrous-reticulate; scape 1–2° high, usually tall and slender; umbel often densely bulb-bearing, with small pinkish flowers, the stamens and style included.—N. England to Florida, and westward to Wisconsin, Missouri, the Indian Territory and Texas.

18. A. MUTABILE, Mx. Bulb-coats fibrous; scape 6-18′ high, terete and usually slender; leaves elongated; umbel usually many-flowered with slender spreading pedicels; sepals 3″ long, acute or acuminate subspreading, longer than the stamens and style.—Florida to N. Carolina and west to Louisiana, and beyond the Mississippi from Missouri to Texas and New Mexico. It appears under two or three forms.

Var. *α*. Tall; the usual form eastward, where it is less fibrous, but also frequent from Louisiana to N. Mexico with densely netted bulbs. (691 Wright, 21, 114 and 119 Lindheimer, 418 Drummond, in part, James, Woodhouse.)

Var. *β*. Low, (6–10′,) the scape usually very slender and leaves very narrow, umbels often rather few-flowered.—From Kansas (Hall) to Texas and N. Mexico, (3219 Berlandier, 113 and 528 Lindh., 418 Drummond, in part, Fendler, Pope.) It also occurs with a stout scape, the leaves broader and umbels many-flowered. Indian Territory and N. Mexico, (Marcy, Pope, 328 Palmer.)

19. A. SCAPOSUM, Benth. Bulbs white, with vertically oblong rectilinear areolations; scape slender, 10–16′ high; leaves linear-terete, elongated; pedicels (10–30) spreading, slender, 6–9″ long; sepals white or pinkish, 3″ long, acuminate, exceeding the stamens.—Mexico, (234 Hartweg;) Presidio del Norte, New Mexico, (Bigelow, Edwards;) San Antonio, S. W. Texas, (418 Berlandier.) PLATE XXXVIII. Fig. 10. Flower; enlarged two diameters. Fig. 11. Reticulation; enlarged thirty diameters.

20. A. ACUMINATUM, Hook. Reticulation irregularly hexagonal, often conspicuous; scape slender, 6–15′ high; leaves elongated; pedicels 12–30, rather short, (4–9″,) spreading; sepals 4–7″ long, bright rose-color, lighter at base, broad and carinate, acuminate and recurved, exceeding the stamens, the inner ones minutely serrulate.—From Fraser's River to California and east to Nevada, Utah and N. Mexico. British Columbia, (Lyall, Holmes;) N. Idaho, (Spalding;) Blue Mts., (Tolmie;) N. California, (469 Frémont;) Monterey, (Bigelow;) San Diego, (Parry;) Ft. Defiance, N. Mexico, (Ives;) Weber Valley, Utah, (Stansbury.) See page 352, and Plate XXXVII.

21. A. Douglasii, Hook. Scape rather low, flattened and somewhat winged; leaves 2, thick, broad-linear, (3–4″ wide,) flat, falcate, nearly equaling the scape; umbel many-flowered, the spreading pedicels 6–8″ long; sepals pinkish, 4″ long, erect, acuminate, equaling or exceeding the stamens.—Washington Territory, (Douglas;) a single imperfect specimen in Herb. Gray. Allied to the following.

* * * * Bulbs without rootstocks; leaves not sheathing the very low scape.

(*a.*) Capsule crested; scape flattened, winged, 2–4″ high; spathe 2-valved; leaves 2, broad-linear, thick, flat, falcate.

22. A. falcifolium, H. & A. Bulb-coats not reticulated; leaves 3–4″ wide; umbel many-flowered, pedicels 3–6″ long; sepals deep-pink, 4–6″ long, attenuate above, obtusish, recurved, glandular-margined, much exceeding the stamens; capsule long-crested.—California, (4663 Bolander.) Plate XXXVI. Figs. 7, 8. Flowers; enlarged two diameters.

23. A. anceps, Kellogg. Bulb-coats white, with minute vertically flattened hexagonal reticulation; leaves 2–4″ wide, rough-margined; pedicels 10–30, spreading, 6″ long; sepals pale-pink or greenish, 4–5″ long, narrow, acute, spreading or recurved, slightly exceeding the stamens; capsule short-crested. See page 352, and Plate XXXVI.

(*b.*) Capsule not crested; scape slender, 1–4′ high; leaves narrow-linear; spathe 2–3-valved.

24. A. tribracteatum, Torr. *Pac. R. R. Surv.* 4. 148. Bulb-coats with minute flattened or somewhat regular hexagonal reticulation; leaves ½–1½″ wide, exceeding the terete scape; umbel 10–20-flowered, spreading, the pedicels scarcely equaling the flowers; sepals 3–4″ long, more or less rose-color or crimson, acute or obtuse, exceeding the stamens.—See page 353, and Plate XXXVIII. Under two forms:—

Var. *a.* Reticulation quite evident; spathe-segments frequently three; sepals acute, light pink, erect or recurved.—"Duffield's Ranch," California, (Bigelow;) San Bernardino, (Parry;) Antelope Island and Wahsatch Mts., Utah.

Var. *β.* Andersoni. Reticulation scarcely distinguishable; spathe 2-bracted; sepals very deep rose-color, obtuse, very variable in shape, often broad-oblong, erect.—W. Nevada.

§ 3. Cells 4–7-ovuled, several-seeded. Bulbs without rootstocks; leaves sheathing; spathe 2-valved; capsule not crested.

25. A. striatum, Jacq. Bulbs sub-bulbiferous; coats not reticulated; scape slender, 4–15′ high; leaves several, narrow-linear, 1–3″ wide, nearly equaling the scape; umbel 4–10-flowered, the slightly spreading pedicels 6–18″ long; sepals white or ochroleucous, 3–5″ long, acute or obtusish, subspreading, exceeding the stamens.—Virginia to Florida and west to S. Illinois and Missouri; Indian Territory, (327 Palmer;) Texas, (524 Lindh., Wright;) New Mexico, (Wright;) Mexico, (231 Hartweg, Edwards.) Doubtless *A. ochroleucum*, Nutt., *Fl. Ark.* 156.

*Reputed species.*

A. campanulæflorum, Geyer. Published without a description. No authentic specimens in our herbariums.

A. maritimum, Benth. (*Hesperoscordum ?*, Torr.) With perennial solid bulbs, many-ovuled cells, and slightly united sepals, is better referred to *Milla*. See page 354.

A. croceum, Torr. *Bot. Mex. Bound.* 218. With "solid bulbs," jointed pedicels, orange-yellow flowers, and filaments appendaged at base, is the same as *Bloomeria aurea*, Kellogg, *Proc. Calif. Acad.* 1. 11, and is hardly an *Allium*. It should, perhaps, also be referred, like *Calliprora*, to *Milla*.

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# MILLEÆ.

Mr. J. G. Baker in his "Revision of the Genera and Species of herbaceous capsular gamophyllous Liliaceæ," in *Jour. Lin. Soc.*, Vol. XI, pp. 349–436, (1870,) divides the Suborder of true *Liliaceæ*, (having a 3-celled capsular fruit and connate styles,) into two series, one with the segments of the perianth free to the very base, the other having them united for at least the lower third or quarter of their length. Of the six tribes into which he subdivides this last series, and which include 26 genera and 220 species, the two tribes *Milieæ* and *Odontostemoneæ* are wholly American and embrace all the American species, with a single exception.

This only excepted genus and species, *Hesperocallis undulata*, Gray, *Proc. Amer. Acad.* 7, 390, appears allied to *Hemerocallis* of the tribe *Hemerocallideæ*, having a leafy stem, racemose funnelform flowers, and

grass-like leaves, but the root, which has not been collected, is described as an edible "bulb" instead of thickly fibrous as in the rest of the tribe. The stem is 2° high, the yellow flowers 2′ long, on short jointed pedicels, the segments twice longer than the tube and 5-7-nerved; stamens 6, with equal filiform filaments inserted in the throat; capsule subglobose, substipitate, many-seeded; leaves with a membranous and strongly undulate margin. Found in New Mexico and Western Arizona.

The tribe *Odontostemoneæ*, characterized by a bulbous root, racemosely panicled flowers, and sparingly leafy peduncle, is limited to the single Californian genus and species *Odontostemum Hartwegi*, Torr., *Pac. R. R. Surv.* 4. 150, *t.* 24. This is 1–2° high, with grass-like leaves, and white tubular flowers 5–6″ long, the at length reflexed segments equaling the tube; pedicels strict, 3–6″ long, in a loose 10–30-flowered raceme; stamens 6, on short filaments united at base and inserted in the throat, alternating with 6 linear staminodia; style elongated; capsule sessile, globose, 3–6-seeded, loculicidally 3-valved.

The *Milleæ* are characterized as bulbous herbs, with naked peduncles, and umbellate or rarely solitary flowers, and are divided into the following genera.

* Corolla-tube furnished with a crown.

1. ANDROSTEPHIUM, Torr. Tube funnelform, equaling the segments. Filaments united into a crown at the throat of the tube. Capsule loculicidally 3-valved, many seeded.—A Texan genus of a single species, A. VIOLACEUM, Torr., *Bot. Mex. Bound.* 218, having a tunicated bulb, an umbel of 3-4 flowers upon a scape 2–4′ high, the perianth 10–12″ long.

2. BESSERA, Schult. Tube campanulate, 4–6 times shorter than the segments. Filaments united to the middle, filiform above. Capsule septicidally 3-valved, many-seeded.—A single Mexican genus and species, B. ELEGANS, Schult., having a tunicated bulb, a 4–10-flowered umbel on a fistulous scape 1–2° high, and a deep-red perianth 9–10″ long, with carinate segments.

* * Without crown.

3. LEUCOCORYNE, Lindl. Perianth funnelform or subrotate, the segments equaling or shorter than the tube. Anthers 3, sessile in the tube. Staminodia 3, spur-shaped, inserted at the throat.—Chili and Peru.

4. BRODIÆA, Smith. Perianth funnelform, (in *B. coccinea* broadly tubular,) the segments longer or shorter than the tube. Anthers 3, sessile, or nearly so, at the throat. Staminodia 3, petaloid, in one row with the anthers.

5. MILLA, Cav. Perianth funnelform, the tube cylindric or campanulate, the segments equaling or 2–4 times longer than the tube. Stamens 6, perigynous, in 1 or 2 rows.

## BRODIÆA.

§ 1. EUBRODIÆA. Scapes erect; perianth funnelform, the oblong-lanceolate segments equaling or exceeding the tube; anthers not winged.

* Umbel loose, the pedicels elongated; ovary shortly stipitate.

1. B. GRANDIFLORA, Sm. Bulb brown-coated; leaves 4–6, subterete, 1½″ broad; scape 6–18′ high; valves of the spathe many, linear; umbel 2–8-flowered, pedicels unequal, 3–18″ long; perianth 9–15″ long, violet, the segments exceeding the tube, the throat 1½–2″ broad; anthers 3″ long, on 1″ long filaments; staminodia subentire, equaling the anthers; style 3–4″ long; cells 3–4 seeded.—From British Columbia to California. Var. MACROPODA, Torr., has a very short scape, the pedicels 3–6′ long. Var. MAJOR, Benth., is taller and stouter, the perianth 18–21″ long, with a broader throat and longer segments.

* * Umbel dense, the pedicels short or almost wanting; ovary sessile.

2. B. CONGESTA, Sm. Bulb brown-coated; leaves 3–4, subterete, 1½–2″ broad; scape 1–2° high; valves of the spathe 3–4, lanceolate; umbel 6–12-flowered, the pedicels 1–3″ long; perianth 8–9″ long, deep violet-blue, the segments about equaling the tube; anthers sessile, 2½″ long, deeply notched at top; staminodia cucullate, deeply emarginate; style 2″ long; cells 5–6-seeded.—From British Columbia to N. California.

3. B. MULTIFLORA, Benth. Scape 1–2° high; flowers 6–20, blue, 6–10″ long, exceeding the pedicels, the segments about equaling the ventricose tube; anthers 2″ long; staminodia lanceolate, entire. See page 353.

§ STROPHOLIRION. Scape long and twining; perianth funnelform, the oblong-lanceolate segments about equaling the ventricose tube; anthers winged.

4. B. VOLUBILIS, Baker. (*Stropholirion Californicum*, Torr., *Pac. R. R. Surv.* 4. 149. *t.* 23.) Leaves 3–4″ broad; scapes 4–12° long; valves of the spathe 4–5, lanceolate; umbel 15–20-flowered, pedicels 3–9″ long; perianth rose-purple, 5–6″ long; anthers sessile, emarginate-winged, 1½″ long; staminodia ligulate,

emarginate; ovary shortly stipitate, the cells 3-4-ovuled; style filiform, 1½″ long; seed often solitary.—California.

§ BREVOORTIA. Scape erect; perianth broadly tubular, 6-saccate at base, the tube 4 times longer than the segments; anthers not winged.

5. B. COCCINEA, Gray. (*Brevoortia Ida-Maia*, Wood. *Proc. Phil. Acad.*, 1867, *p.* 173.) Leaves 2–3″ broad, 1° long or more; scape 2–3° high; valves of the spathe 4–6, lanceolate or linear, deep-red, 6–12″ long; umbel 4–12-flowered, pedicels 8–12″ long; perianth 12–16″ long, the tube deep-scarlet, 3–4″ broad, the lanceolate-oblong segments yellowish, 2½–3″ long, spreading; anthers linear, equaling the segments, emarginate at base; staminodia yellowish, very broad, square, toothed, half-shorter than the anthers; ovary oblong, stipitate, the cell 4-6-ovuled; style 8–9″ long, filiform.—California.

## MILLA.

South American species are omitted.

§ BRODIÆOPSIS. Tube broadly funnelform, exceeding the segments; stamens in 2 rows at the base and middle of the segments.

1. M. GRANDIFLORA, Baker. 1½–2° high; flowers 6–30, on jointed pedicels, deep-blue, 8–10″ long; ovary stipitate. See page 354.

§ EUMILLA. Tube funnelform, 1½–2 times shorter than the (oblong-lanceolate) segments; stamens in one row on the throat of the tube.

2. M. BIFLORA, Cav. Leaves 4–6, filiform, 6–12′ long; scape 6–18′ high; flowers 1–4, the pedicels strict, 2–6′ long, thickened at top; valves of the spathe many, linear; perianth whitish, 15–18″ long, segments carinate with a green midvein, the inner ones narrower; stamens 2–2½″ long, subsessile, wingless; ovary oblong, on a short obconic stipe; style 5–6″ long; cells 5–9-seeded.—Mexico; New Mexico, (1913 Wright.)

3. M. CAPITATA, Baker. (*Brodiæa*, Benth.) Leaves 2″ broad; scape 1–2° high; valves of the spathe many, lanceolate, violet; umbel crowded, 5–9-flowered, pedicels 3″ long or less; perianth 7–8″ long, deep lilac-blue; stamens 1½″ long, sessile, the alternate ones emarginate-winged; ovary narrowed at base; style 2″ long; cells 8–9-seeded.—California, and in New Mexico and Arizona a form (Var. PAUCIFLORA, Torr.) with 2–4-flowered umbels.

§ TRITELEIA. Tube funnelform, equaling or rarely exceeding the segments, or 1½–2 times shorter; stamens in 2 rows, upon the tube. In N. American species, pedicels jointed; umbel many-flowered; ovary long-stipitate.

* Filaments elongated, winged laterally at base. (*Calliprora*, Lindl.)

4. M. IXIOIDES, Baker. Scape 6–18′ high, with 2–3 leaves, 2–6″ broad; valves of the spathe 3–4, linear; umbel 10–20-flowered, the pedicels 1–2′ long; perianth yellow, 7–12″ long, the lanceolate-spatulate segments dotted with green, twice longer than the turbinate tube; filaments flattened, 3-cuspidate, 2–2½″ long; style 1½″ long; cells 5–6-seeded.—California.

* * Filaments very short and wingless, or none. California. (*Seubertia*, Kth.)

5. M. LAXA, Baker. Leaves 2–4″ broad, 1° long or more; scape 12–18′ high; valves of the spathe many, 6–9″ long; umbel 8–20-flowered, the pedicels 1–3′ long; perianth deep-blue, 15–18″ long, the lanceolate acute segments shorter than the tube; anthers linear, exceeding the filaments; stipe of the ovary 6–9″ long, cells 12–15-ovuled; style 1½″ long.

6. M. PEDUNCULARIS, Baker. Leaves 3–4″ broad, 1° long or more; scape 1½–2° high; valves of the spathe many, linear; umbel 12–20-flowered, the pedicels 2–3′ long; perianth blue, 8–9″ long, the lanceolate-spatulate acute segments a little exceeding the tube; anthers sessile, 1½″ long; stipe 2–2½″ long; cells 3–4-seeded.

7. M. CROCEA, Baker. (*Seubertia*, Wood, *l. c.*, *p.* 171.) Scape 1° high, exceeding the linear leaves; valves 4, shorter than the pedicels; umbel 5–6-flowered; perianth yellow, 9″ long, the segments obtuse; anthers oblong; cells 5-seeded.

§ HESPEROSCORDIUM. Tube campanulate, 3–4 times shorter than the segments; stamens more or less distinctly 2-rowed, upon the tube.

8. M. HYACINTHINA, Baker. Scape 1–2° high, with 2–3 leaves, 1–6″ wide; umbel 10–30-flowered, pedicels ½–1′ long; perianth 4–7″ long, greenish white; cells 2–3-seeded. See page 354.

9. M. MARITIMA. Scape 3–6′ high; perianth 3″ long, segments scarcely connate. See page 354. This species is here added to the genus notwithstanding the very short tube of the perianth.

# JUNCUS.

Drawn up from the extended revision of the North American species by Dr. GEORGE ENGELMANN in *Trans. Acad. Sci. St. Louis*, Vol. II., pp. 424–498, (1868.)

§ 1. GENUINI. Scape naked, the basal sheaths also leafless, or rarely bearing terete leaves similar to the scape.

* Flowers in clusters in a compound panicle; stamens 6; sheaths leaf-bearing, (unknown in *J. Cooperi.*)

1. J. ACUTUS, L. Stout, nearly 4° high; panicle 6′ long; sepals broadly margined, shorter than in the next, the inner deeply emarginate; stigmas thick and short-subulate; capsule deep-brown, almost globose.—Europe; S. Africa; S. America. Coast of S. California.

2. J. COOPERI, Eng. Stout, rigid, nearly 2° high; clusters 2–5-flowered in a strict green panicle 3′ long, 1′ wide; outer sepals 3″ long, lanceolate, subulate-acute, the inner ovate-lanceolate, mucronate, slightly shorter, scarcely exceeding the broadly linear (1¾″ long) anthers; filaments very short; capsule ovate at base, acute, scarcely angled, indurated, greenish, slightly exserted; seeds rather large, appendaged, costate-reticulate.—S. California, (Cooper.)

3. J. RŒMERIANUS, Scheele. Panicle effuse; inner sepals shorter, obtusish; anthers deciduous; style very short; capsule obtuse, with spongy placentæ, deep-brown; seeds oval, obtuse.—N. Carolina to Florida; Texas.

* * Flowers solitary in the panicle.

(*a.*) Flowers many; panicle more or less compound.

(1.) Rather stout; capsules ovate or obovate; hexandrous, the anthers stout, on very short filaments.

(1ᵃ.) Sheaths leaf-bearing.

4. J. COMPRESSUS, HBK. Rootstock creeping; scape 10–18′ high, compressed; sheaths with short leaves or sometimes blunt and leafless; panicle small, rather simple, the extreme branchlets with secund flowers; sepals lanceolate, the outer acute, the inner a little shorter, obtusish, ½–¼ longer than the stamens; style nearly equaling the ovary; capsule ovate, acute; seeds ovate, obtuse, scarcely pointed, smoothish.—Salinas Valley, California; Northern Mexico.

(1ᵇ.) Sheaths leafless.

5. J. BREWERI, Eng. Rootstock perpendicular; scape 1° high, compressed; panicle small, rather compact; sepals 2½″ long, subequal, ovate, broadly margined, abruptly acuminate; stigmas exserted; style equaling the ovary.—Capsule and seeds unknown. Monterey, California.

6. J. BALTICUS, Deth., Var. LITTORALIS, Eng. Scape terete; outer sepals 2″ long, acute, the inner obtusish, shorter; capsule elliptical, rather triangular, obtuse and pointed; seeds ovate, obtuse, very shortly apiculate, ½″ long or more.—Newfoundland to N. England and Pennsylvania, and west to the Upper Mississippi.

Var. MONTANUS, Eng. Sepals nearly equal and similar, or the inner more obtuse; capsule ovate-pyramidal, angled, beaked; seeds smaller, narrower, longer apiculate. See page 356.

7. J. LESUEURII, Bol. Rootstock creeping: scape 2–3° high, stout, soft, terete, often 2–3″ thick and fistulous; panicle usually compact; flowers secund, 2½–3″ long; sepals lanceolate, the outer very acute, a little exceeding the obtuse inner ones, all connivent above the shorter or equal ovate acute capsule; seeds ⅓″ long, ovate, obtuse, shortly or scarcely apiculate, very minutely reticulate or smoothish.—San Francisco; Chili.

(2.) Rather stout; sheaths leafless; capsules ovate or obovate; triandrous; filaments nearly equaling the linear anthers.

8. J. PROCERUS, E. Mey. (?) Scape 3° high, terete; sheaths dark-brown, obtuse, shortly awned; panicle decompound, dense, many-rayed and corymb-like; sepals equal, lanceolate, the outer acute-subulate, the inner obtuse, mucronate, equaling the ovate subacute capsule; stamens one-fourth shorter; seeds rather large, ovate.—San Francisco; Chili?

9. J. EFFUSUS, L. Sepals very acute; capsule triangular-obovate or clavate, retuse and pointless.—From Maine to the Rio Grande and Pacific.

(3.) More slender; flowers usually fewer, often greenish, hexandrous; sepals often spreading in fruit; capsule subglobose.

(3ᵃ.) Sheaths leafless.

10. J. PATENS, E. Mey. 1½–3° high; sheaths elongated, awned; panicle 1–2′ long, 3–5-branched,

the branchlets secund, spreading or recurved; sepals not 2″ long, usually light-colored, lanceolate, acute, equal, or the outer subulate ones a little longer; stamens half-shorter, the anthers equal to the filaments; style short; capsule subglobose, mucronate; seeds ¼″ long, numerous, ovate, obtuse, obliquely apiculate.—California.

11. J. FILIFORMIS, L. Very slender; panicle almost simple; sepals exceeding the broadly ovate obtuse short-pointed greenish capsule. See page 356. Also found in S. Greenland.

12. J. SMITHII, Eng. Panicle nearly simple; sepals brown, equal, the inner obtuse, a little shorter than the acute and pointed deep-brown capsule; seeds few, large, short-appendaged.—Pennsylvania.

(3b.) Sheaths leaf-bearing.

13. J. SETACEUS, Rostk. Panicle few-flowered; sepals smooth and shining; capsule globose, beaked; seeds subglobose, coarsely lined.—N. Carolina to Florida and Louisiana.

(*b.*) Flowers few, the panicle scarcely ever compound; stamens 6. Arctic or subalpine.

(1.) Seeds only apiculate.

14. J. ARCTICUS, Willd. Rootstock creeping; sheaths leafless; scape terete; sepals ovate-lanceolate, acute, shorter than the elliptical triangular mucronate capsule; seeds obovate, oblique, obtuse.—Europe; Asia; Greenland. Var. SITCHENSIS, Eng. Spathe elongated; sepals longer, nearly equal; capsule turbinate-pyriform; seeds very few.—Sitka and northward on the coast; Kamchatka.

(2.) Seeds caudate.

15. J. DRUMMONDII, E. Mey. Sheaths leafless, bristle-pointed; flowers 1–3, 3″ long; seeds ⅛″ long, equaling or shorter than the appendage. See page 356.

16. J. HALLII, Eng. Scapes 6–12′ high, terete, filiform, much longer than the terete bristleform (2–5″ long) leaves; spathe scarcely exceeding the close subsimple 2–5-flowered panicle; sepals 2″ long, lanceolate, acute, white-margined, the outer a little longer, and twice longer than the stamens; anthers nearly equaling the filament; stigmas subsessile, equaling the ovate ovary; capsule ovate, angled, retuse, scarcely exserted; seeds oblong-linear, striate-reticulate, ⅛″ long, the tail but half as long.—Colorado.

17. J. PARRYI, Eng. A span high; sheaths leafy; panicle 1–3-flowered; outer sepals bristle-pointed, about 3″ long; capsule acute; seed and appendage 1″ long. See page 357.

§ 2. GRAMINIFOLII. Stems naked or leafy; leaves flat, or semi-terete and channeled, or rarely subterete, never knotted.

* Alpine; seeds few, large, caudate; leaves fistulous; stamens 6.

(*a.*) Flowers few.

18. J. TRIFIDUS, L. Low, tufted; leaves 2–3 at the summit, threadlike; flowers 1–4, sessile; sepals brown, 2″ long or less, acute; capsule ovate, beaked; seeds 1″ long, angled.—Greenland; Newfoundland; mountains of N. England and Northern New York.

19. J. BIGLUMIS, L. Leaves deeply grooved below, nearly terete or slightly flattened upward; head 2-flowered, one flower pedicelled, usually shorter than the spathe; capsule turbinate, retuse, exceeding the obtuse sepals; seeds ovate-oblong, ⅓″ long, a little exceeding the appendage.—N. Europe and Asia; Greenland; Arctic Coast to Behring Strait and in the subarctic Rocky Mts.

(*b.*) Flowers in small heads.

20. J. TRIGLUMIS, L. Leaves roundish, channeled and 2–3-tubular below, flattened upward; sheaths auricled at top; head 3-flowered, equaling the membranous spathe; capsule elliptical, acute, exceeding the obtuse sepals; seeds ⅓″ long, with longer appendages.—Europe; Asia; Greenland; Arctic Coast and in the Rocky Mts. to Colorado.

21. J. STYGIUS, L. With 1–3 threadlike leaves below; heads 1–2, of 3–4 flowers; filaments many times exceeding the anther; stigmas recurved; capsule exserted; seeds 1½″ long.—N. W. New York to Newfoundland; Lake Superior.

22. J. CASTANEUS, Sm. Stem leafy; leaves terete, deeply channeled at base; heads somewhat in pairs, sessile or peduncled, shorter than the rather large spathe; sepals 3″ long or more, equaling the stamens, shorter than the oval-triangular rather long-mucronate capsule; anthers pointed, half as long as the filaments; stigmas exsert; style short; seeds oblong, ½″ long, the tail twice longer.—Europe; Asia; Greenland; and from Arctic America to the Saskatchewan, Colorado and Washington Territory; Newfoundland.

* * Flowers solitary, panicled; stamens 6.

(*a.*) Stems slender, simple, tufted, leafy below; root perennial.

(1.) Seeds caudate.

23. J. VASEYI, Eng. Leaves slightly channeled at base; panicle light-colored, loose, few-flowered; capsule ovate, retuse; seeds slender, conspicuously caudate at both ends.—Michigan to the Saskatchewan and Rocky Mts.; Colorado.

24. J. GREENII, Oakes & Tuckerm. Shorter; leaves deeply channeled; panicle dense, many-flowered; capsule ovate-oblong, obtuse; seeds ovoid, tails shorter.—N. England; Michigan.

(2.) Seeds only apiculate.

25. J. TENUIS, Willd. Leaves flat; sepals equal, lanceolate, subulate, spreading, exceeding the ovoid retuse green capsule; seeds ¼″ long, white-pointed at both ends.—Through the United States from the Atlantic to the Pacific and southward to the Tropics and W. Indies; W. Europe. The northeastern Var. SECUNDUS, Eng., has smaller secund flowers along the incurved branches, and in Var. CONGESTUS, Eng., of California and Colorado, the branches are contracted into a head and the flowers darker-colored.

26. J. DICHOTOMUS, Ell. Stouter; leaves filiform, slightly channeled; sepals as long as the globose beaked reddish capsule; otherwise nearly as the last.—N. Jersey to Florida.

27. J. GERARDI, Lois. Panicle contracted; sepals oval-oblong, obtuse, incurved, equaling the oval obtuse mucronate capsule; seeds larger, obovate.—Salt marshes from Canada to Florida, and on the Great Lakes.

(*b.*) Stems branched, diffuse, leafy; root annual.

28. J. BUFONIUS, L. Low and slender. See page 357.

* * * Flowers capitate, (in Nos. 29 and 30 often solitary.)

(*a.*) Stamens 3, (in *J. leptocaulis* 3–6.)

(1.) Annual, very low, branched; leaves filiform.

29. J. KELLOGGII, Eng. Much branched; leaves channeled above, 6–10″ long; branchlets short, leafy below, bearing loose terminal 3–5-flowered heads and sometimes longer 2-flowered peduncles in the axils; sepals lanceolate-subulate, equal, pale-green and whitish, 1⅔–2″ long, exceeding the stamens and nearly equaling the ovate obtuse mucronate membranous capsule; anthers oblong-linear, shorter than the filament; seeds ovate, ¼″ long, scarcely pointed, with a few strong ribs.—San Francisco.

30. J. TRIFORMIS, Eng. Less branched, the many capillary scapelike peduncles much exceeding the leaves; flowers few, in small heads, or solitary.—See page 357. Variable; the typical form being 2–4′ high, heads 3–5-flowered, sepals slightly exceeding the stamens and rather long-mucronate capsule, anthers twice longer than the filaments, style exserted, several times longer than the ovate ovary, stigmas elongated. Var. BRACHYSTYLUS, Eng., is 1–2′ high, flowers 1–3 together, sepals twice longer than the stamens, equaling, or nearly so, the obtuse very shortly mucronate capsule, anthers half as long as the filaments, the very short style and stigmas included. Var. UNIFLORUS, Eng., is ½–1′ high, the solitary flowers mostly dimerous.

(2.) Stems compressed, simple, leafy; leaves flat.

31. J. REPENS, Mx. Annual; stems ascending or creeping; leaves fascicled on the stem; inner sepals much the longer; capsule linear, obtuse; filaments long.—Maryland to Florida and Louisiana.

32. J. MARGINATUS, Rostk. Perennial, erect, 1–3° high; inner sepals mostly obtuse, exceeding the acute outer ones, equaling the subglobose obtuse scarcely pointed capsule; anthers purple.—N. Jersey to W. Canada and Illinois, southward to S. Carolina, Arkansas and Texas.

33. J. LEPTOCAULIS, T. & G. Rootstock small, apparently perennial; stems tufted, slender, 6–14′ high, slightly compressed, fistulous, few-leaved; heads 1–3, of 3–7 light-green flowers; bracts ovate, awned, mostly shorter than the subpedicelled flower; sepals 2″ long, usually equal, ovate-lanceolate, acuminate awned, ¼ longer than the 3–6 stamens and the obovate retuse mucronate capsule; anthers 2–3 times shorter than the filament; stigmas equaling the ovary with its very short style; seeds obovate, pointed, strongly ribbed.—Arkansas; Texas.

(*b.*) Stamens 6.

34. J. FALCATUS, E. Mey. Rootstock ascending, stoloniferous; stems 2–15′ (usually 6–8′) high, compressed, 1-leaved or naked; leaves flat, adverse, mostly laterally curved; heads usually single, 8–18-flowered, (in Var. PANICULATUS about 5-flowered, in a simple or subcompound panicle;) sepals 3″ long, ovate, scabrous, the outer acuminate, equaling or exceeding the obtuse sometimes mucronulate inner ones and the obovate obtuse mucronate capsule; anthers much exceeding the filament; stigmas long and exserted; seeds lanceolate-ovate, subcaudate, costate-reticulate.—Unalaska to California.

35. J. OBTUSATUS, Eng. Rootstock creeping; stems tufted, a span high, mostly 1-leaved; nearly equaling the flat linear leaves; heads few, few-many-flowered, in a simple panicle; sepals 1½–2″ long, green with brown margins, slightly scabrous, ovate, equal, the outer often cuspidate, the inner very obtuse, much shorter than the ovate obtuse very shortly mucronate capsule; stamens half-longer than the sepals; stigmas long, exserted; seeds ovate, obtuse or scarcely pointed, reticulate.—Big Tree Grove, California.

36. J. LONGISTYLIS, T. & G. 1–2° high; heads in a contracted panicle, rarely solitary; sepals equal, ovate-lanceolate, acute; seeds oblanceolate or obovate. See page 357.

§ 3. ARTICULATI. Stem leafy; leaves knotted by internal cross-partitions.

* Leaves terete or slightly compressed.

(*a*.) Seeds barely pointed.

(1.) Heads 2–1-flowered; stamens 6.

37. J. PELOCARPUS, E. Mey. 6–18′ high; leaves threadlike; panicle compound, spreading; flowers small, secund; sepals obtuse.—Newfoundland to Wisconsin and south on the coast to Florida. Var. (?) SUBTILIS, Eng. Creeping or floating, mostly with a single 2-flowered head; stamens 3.—Canada.

(2.) Heads few-flowered.

($2^a$.) Stamens 6.

38. J. ARTICULATUS, L. 9–15′ high; panicle short, dense, spreading, brown; sepals mostly acute; capsule deep-brown, ovate-oblong, acute.—N. Europe; Newfoundland; N. England to New York and Delaware.

39. J. ALPINUS, Vill. Europe; Asia. Var. INSIGNIS, Fr. 9–18′ high; panicle erect, elongated, greenish or light-brown; sepals obtuse; capsules light-brown, obtuse, mucronate.—From Lake Cham plain to N. Illinois, Colorado and Washington Territory and north to the Arctic Ocean.

40. J. DUBIUS, Eng. Rootstock thick, horizontal; stems 1½–3° high, erect, terete-compressed, as also the leaves; panicle 3–5′ long, decompound, spreading; heads 6–10-flowered, straw-color; flowers subsessile; sepals nearly 2″ long, lance-subulate, very acute, equal; stamens half as long, the anthers rather exceeding the filament; capsule linear-prismatic, acute, 1-celled, exserted; seeds obovate, ¼″ long, pointed at both ends, 5–7-ribbed and reticulate.—Resembling *J. oxymeris*. Big Tree Grove, California.

41. J. MILITARIS, Big. 2–4° high; leaf single, stout, erect; panicle about 3′ long; heads mostly 5–12-flowered; sepals lanceolate, outer awl-pointed, equaling the ovate beaked 1-celled capsule.—Maine to Maryland.

($2^b$.) Stamens 3.

42. J. SUPINIFORMIS, Eng. Stem 1° high or more, shorter than the erect terete leaves; early leaves capillary, floating; panicle simple; heads about 5-flowered; sepals 2″ long, ovate-lanceolate, cuspidate, equal, or the outer a little shorter; anthers much shorter than the filament; style very short; capsule prismatic, obtuse, mucronate, 1-celled, scarcely exserted; seeds obovate, pointed at both ends.—Mendocino City, California.

43. J. ELLIOTTII, Chap. Stems slender, 1–2° high, much exceeding the leaves; panicle 3–4′ long, subspreading; heads 3–9-flowered, globose; sepals 1″ long, ovate-lanceolate, very acute, equal and nearly equaling the dark-brown and shining broadly ovate obtuse very shortly mucronate 1-celled capsule; anthers scarcely exceeding the filament; stigmas subsessile; seeds oblanceolate, attenuate each way, dark-brown, reticulated.—N. Carolina to Florida and S. Mississippi.

44. J. ACUMINATUS, Mx. Panicle effuse; heads few–many-flowered, pale or at length darker; sepals lanceolate-subulate, very acute, equal, equaling or shorter than the prismatic short-pointed capsule.—Very variable. From New England to Missouri and the Rio Grande.

(3.) Heads many-flowered.

($3^a$.) Stamens 3.

45. J. BRACHYCARPUS, Eng. 1–2½° high, with 2–10 dense globose heads in a short panicle; sepals 2″ long, lanceolate-subulate, the inner much shorter than the outer, but exceeding the ovoid pointed pod.—Ohio to Missouri and south to Louisiana and Texas.

46. J. SCIRPOIDES, Lam. 1–4° high, with few–many dense pale-green globose heads; sepals rigid, subulate and bristle-pointed, nearly equaling the pyramidal subulate 1-celled capsule.—Variable. New Jersey to Florida and west to Arkansas and Texas.

47. J. BOLANDERI, Eng. Stems 2° high or more, slender, compressed; sheaths of the terete leaves long-auricled; heads 30–50-flowered, solitary or few in a cluster, or shortly peduncled; flowers brown, sessile; sepals linear-lanceolate, subulate, 2″ long, equal, equaling the clavate-turbinate obtuse mucronate capsule; filaments 2–3 times longer than the pointed anthers; seeds obovate, reticulate, ¼″ long.—Near Mendocino City, California.

($3^b$.) Stamens 6.

48. J. NODOSUS, L. 6–15′ high; stolons tuberiferous; heads 8–20-flowered, brown; sepals lance-linear, acute, shorter than the slender beaked 1-celled capsule; seeds reticulated.—The typical form from Hudson's Bay to Pennsylvania and Wisconsin and west to the Pacific. Var. MEGACEPHALUS, Torr.; see page 358. Var. TEXANUS, Eng.; taller, panicle compound, flowers larger (2½″) and more numerous, anthers obtuse, often twice as long as the filaments; only in Texas.

(*b.*) Seeds caudate.

(1.) Stamens 3.

49. J. CANADENSIS, J. Gay. Heads few–many-flowered; outer sepals the shorter; capsule prismatic, mostly exsert and short-pointed.—Very variable. From N. England and Canada to Wisconsin, and southward to Georgia, Ohio and Illinois; Louisiana.

(2.) Stamens 6, (or often 3 in *J. caudatus.*)

50. J. CAUDATUS, Chapm. Stems 2–3° high, terete and with the rigid leaves smooth; panicle compound or decompound, suberect, 2-6′ long; heads 2-5-flowered; sepals nearly 2″ long, lanceolate, 3-5-nerved, the outer acute, equaling the stamens, the inner subulate, longer; style very short; stigmas exserted; capsule pyramidal, acute, dark-red, long-exserted; seeds linear-oblong, many-striate, ½″ long, the tail mostly longer.—S. Carolina to Florida and Louisiana.

51. J. ASPER, Eng. 2–3° high, stem and leaves rough; sepals 2½″ long; seeds larger, dark, the tails often reddish.—N. Jersey.

* * Leaves compressed and equitant, ensiform. Stems compressed or ancipital; flowers pedicelled, in few–many-flowered heads; stamens 6–3.

52. J. MERTENSIANUS, Bong. Stems compressed, 7–14′ high; flowers very dark brown in a single head, rarely 2–3; capsule broadly obovate, obtuse, mucronate. See page 358.

53. J. XIPHIOIDES, E. Mey. Stems 1–4° high, ancipital; heads few or many; capsule prismatic, acute, sometimes rostrate.—Very variable. See page 358. Other forms occur in California and northward to Unalaska.

54. J. OXYMERIS, Eng. Stems 2–3° high from a creeping rootstock, erect or ascending, compressed; leaves 1–2½″ wide; panicle decompound, 4-6′ long, spreading or strict; heads 5–10-flowered, pale; sepals about 2″ long, linear-lanceolate, acuminate-awned, the inner often a little the longer, mostly shorter than the lanceolate rostrate 1-celled capsule; stigmas exserted, the style equaling the ovary; seeds ¼′ long, ovate-oblanceolate, reticulate with smooth areas.—California.

55. J. PHÆOCEPHALUS, Eng. Stems erect, compressed, with 1, few or rarely more heads; sepals 2–2½″ long, dark-brown, lanceolate-ovate, equal, acute to subulate or sometimes obtuse, usually equaling the obtuse or acute long-mucronate capsule; anthers 2–3 times longer than the filament; style equaling the ovary; stigmas long, exserted; seeds ovate, pointed each way, ⅓″ long, reticulate, the areas smoothish.—California; variable.

56. J. CHLOROCEPHALUS, Eng. Heads pale; sepals broad and obtuse; style several times longer than the ovate ovary; stigmas shorter; capsule ovate, obtuse, shorter than the sepals. See page 359.

# YUCCA AND AGAVE.

The following addition to the Catalogue of the plants of Nevada and Utah is from Dr. George Engelmann as a result of his recent study of our hitherto ill-defined and little understood species of these genera.

## YUCCA, L.

Perianth cup-shaped, of six (whitish) petal-like lance-oval acutish leaves, withering-persistent, longer than the six club-shaped stamens. Stigmas 3, more or less united. Pod oblong or cylindrical, somewhat 6-sided, 3-celled, the cells incompletely 2-celled by a partition from the back. Seeds very numerous, flat, horizontal, in 6 rows, black, with the linear straight or curved embryo diagonal, as long as the albumen.—Stems woody, fibrous, very short or rising into thick columnar palm-like simple or branching trunks, bearing persistent rigid linear or lance-linear mostly sharp-pointed leaves, with smooth, rough, or filamentose edges, and terminated by an ample compound panicle (or rarely a spike) of showy pendulous flowers, opening wide in the evening and half-closed in the morning.

§ 1. EU-YUCCA. Filaments club-shaped, obtuse, papillose-pubescent, mostly shorter than the pistil, often spreading or recurved; anthers oblong or sagittate; ovary prismatic or subcylindric, obtuse or narrowed into a sort of style; stigmas elongated, bi-lobed, papillose.

* *Sarcocarpa.* Pendulous fruit fleshy and indehiscent; thick seeds somewhat rugose, with deeply lobed (ruminated) albumen.

1. Y. baccata, Torr. *Bot. Mex. Bound.* 221. Stems none, or short, or several feet high; leaves very thick and rigid, lance-linear, narrowed above the broad base, concave, terminating in a stout spine, with very coarse marginal fibres; flowers panicled; petals rhombic-ovate ($1\frac{1}{4}$–$1\frac{1}{2}'$ long) or linear-lanceolate, (sometimes over $3'$ long;) ovary attenuate into a style; stigmas short; fruit ovate or cylindric, long-rostrate.—From New Mexico and S. Colorado, through S. Utah, to Arizona, California and Mexico. Northward a low plant, it becomes a tree farther south; leaves $1\frac{1}{2}$–$2^{\circ}$ long, $1\frac{1}{4}$–$2'$ wide. The edible sweet fruit are often called "Dates;" seeds variable in size, usually the largest in the genus, $5$–$6''$ wide, $1\frac{1}{4}$–$1\frac{1}{2}''$ thick.

* * *Clistocarpa.* Fruit indehiscent, at last dry; seeds thickish, smooth, with the albumen entire.

2. Y. brevifolia, Eng. (*Y. Draconis*, Var. *arborescens*, Torr. *Bot. Whipp., Pac. R. R. Surv.* 4. 147.) Tree-like, at last much branched; the short narrow leaves crowded at the end of the branches, thick, very rigid, stout and sharp-pointed, not narrowed above the broad base, serrulate on the margin; panicle sessile at the end of the branches; fruit large, $4'$ long, ovate, pointed.—Deserts of S. Utah, through Arizona, to S. E. California where it forms entire forests on the desert plateaus at 2–4,000 feet altitude. Often $20$–$30^{\circ}$ high and $1$–$2^{\circ}$ in diameter, with a thick rough bark; leaves $4$–$6'$ or in younger specimens $10$–$12'$ long, $\frac{1}{3}$–$\frac{1}{2}'$ wide, stiffer and stouter pointed than any other in the genus. The flower when known may make it necessary to remove it from § *Euyucca.*

* * * *Chænocarpa.* Erect fruit dry, septicidally 3-valved from the apex, the valves at last again divided at tip; seed very thin, smooth, with an entire albumen.

3. Y. angustifolia, Pursh. Stems none or short; leaves narrowly linear, scarcely narrowed above the broad base, rigid, spiny-pointed, nearly flat above, convex below, with very slender marginal fibres, $1\frac{1}{2}$–$2\frac{1}{2}^{\circ}$ long; flowers spiked; petals broad-ovate, $1\frac{1}{2}$–$1\frac{3}{4}'$ long; stigmas half as long as the ovary, sessile, erect; capsule cylindric-ovate, thick, obtuse, short-pointed; seed large, ($5$–$7''$ in diameter,) with a wide margin.

Var. *β.* radiosa, Eng. Stems several feet high; flowers in large panicles; petals narrow lanceolate, $1\frac{1}{2}$–$1\frac{3}{4}'$ long.

Western plains to Texas, Colorado, New Mexico and into Utah; the variety in Central Arizona and northward to the borders of Utah. A very variable plant, which eastward toward the Mississippi and the Gulf has broader, shorter, and more flaccid leaves, (*Y. stricta*, Sims ?,) but is always recognized by the thick never constricted obtuse capsule and the large broad-margined seed, $5$–$7''$ wide. Both forms here

noticed have very narrow leaves, the former 6″, the latter 4–5″ wide. About St. George, Utah, a form occurs with leaves only 2″ wide.

§ 2. HESPERO-YUCCA. Filaments thickened upward, acute, smooth, mostly longer than the pistil, erect; anthers didymous, broader than long; ovary oval, the slender style tipped with a broad short 3-lobed stigma, bearing numerous filiform papillæ; erect capsule loculicidally 3-valved from the apex, valves entire, undivided; seeds thin, smooth, with entire albumen.

4. Y. Whipplei, Torr. *Bot. Mex. Bound.* 222. Stems none or short, prostrate; leaves few, often falcate, rigid but not thick, gradually widening toward the broad base, rough on the margin, sharp-pointed, striated, glaucous, 12–18′ long, ½′ wide or less; flowers panicled; petals lance-oval, 1½–3′ long; capsule small, ovate or obovate, obtuse; seed narrowly margined.—From N. W. Arizona to the mountains and coast ranges of S. California; it may be expected in S. Utah. Flowers very different in size, some specimens with the largest in the genus; style sometimes as long as the ovary or much shorter.

The following genus is founded on a plant from W. Texas, originally described as a doubtful *Yucca*, then as an *Aloe*, but evidently distinct from both.

## HESPERALOE, Eng. *N. Gen.*

Perianth cylindric, of 6 (reddish) petal-like linear obtuse leaves, united at base, withering-persistent, the outer ones cucullate at apex; filaments from a broad adnate base, subulate-filiform, of the length of the perianth, geniculate-inflexed below the tip; anthers oblong, bifid below; ovary ovate, 3-celled, several times shorter than the filiform style; small capitate stigma exsert; capsule 3-celled, 6-valved, with 6 rows of thin black horizontal Yucca-like seeds, with a linear diagonal embryo of the length of the albumen.—Corm bearing the Yucca-like filamentose-margined leaves and a scape, with the fascicled flowers in a spike or few-branched panicle. The leaves, pollen,[1] and seeds are those of a *Yucca*, the perigon and pistil that of an *Aloe;* the filaments, being adnate at base and geniculate upwards, resemble those of an *Agave.*

Hesperaloe yuccæfolia, Eng. (*Yucca (?) parviflora*, Torr. *Bot. Mex. Bound.* 221. *Aloe yuccæfolia*, Gray. *Proc. Amer. Acad.* 7. 390.)

## AGAVE, L.

Perianth tubular, funnelform or campanulate, persistent, 6-parted, the divisions nearly equal. Stamens 6; filaments more or less adnate to the tube, inflexed in the bud, at last exsert; anthers linear, versatile. Pod coriaceous, 3-celled, loculicidally 3-valved from the apex. Seeds many, black, flat, horizontal, in 2 rows in each cell.—*Leaves thick and fleshy, mostly terminating in a spine, on the margins spiny-toothed or often cartilaginous-denticulate or rarely filamentous or entire, clustered at the base of the many-flowered scape from a thick fibrous-rooted crown or on the top of a short trunk.*

A. Utahense, Engelm. *N. sp.* Leaves basal, stout, very fleshy, tapering from a broad base and terminating in a long channeled spine, herbaceous on the sinuate margins between the horny flat teeth; scape bearing a dense spike of small yellowish flowers in fours or pairs; the oblong obtuse erect lobes of the perigon as long as the ovary, 3–4 times the length of the short campanulate tube; stamens from the middle of the tube, together with the style slightly exsert; anthers of the length of the lobes; capsule cylindric-ovate, acute.—About St. George, Utah, (Dr. E. Palmer, J. E. Johnson.) Leaves at base 1½–2′ wide, 5′ long, with stout broad white straight or rarely recurved spines on the margin; terminal spine whitish, nearly 1′ long; each leaf marked with the impressions of the teeth of those next to it; scape 5–6° high; flowers, ovary included, about 1′ long, tube very shallow, scarcely more than 1″ long; capsule and seeds among the smallest in the genus, the former 9–10″ long, the latter 1½–2″ in longest diameter. Allied with *A. heteracantha*, Zucc., (*A. Poselgeri*, Salm. *A. Lecheguilla*, Torr.,) which extends from Mexico into New Mexico and Arizona.

[1] The pollen-cells of *Yucca* are globose, 0.055–0.065 mm. diam.; those of *Hesperaloe* are similar but only 0.050–0.055 mm. diam., and those of *Aloe* 0.030–0.050 mm. diam., globose when fresh, but when dry lanceolate, folded or grooved, (much like those of *Hyacinthus* and many other *Liliaceæ*,) slowly becoming globose when soaked.

# CORRECTIONS.

Page 8. Under RANUNCULUS DIGITATUS, for "Mt. Tobin" read "Havallah."

Page 9. Under RANUNCULUS ORTHORHYNCHUS, for "*R. amœnus*, Gray," read "*R. adoneus*, Gray, *Proc. Phil. Acad.*, Mar. 1863, *p.* 56, (*R. amœnus*, Gray, *Sill. Jour.*, *n. s.*, 33. 12.")

Page 45. For "BERGIA AMERICANA" read "BERGIA TEXANA."

Page 48. Under SPHÆRALCEA EMORYI, for "*S. angustifolia*, Benth." read "*S. angustifolia*, Spach."

Page 48. For "SIDALCEA ACERIFOLIA" read "SPHÆRALCEA ACERIFOLIA."

Page 72. Under ASTRAGALUS UTAHENSIS, for "6,000 feet" read "8,000 feet."

Page 115. In note, for "Seeds brown or black" read "Seeds yellowish-brown or sometimes black."

Page 116. Under ECHINOCACTUS WHIPPLEI, for "the upper much longer" read "the upper one much longer," and in note, for "Seeds brown or black" read "Seeds black or, rarely, brown."

Page 117. In note, omit "lateral" after "flowers."

Page 118. Under OPUNTIA SPHÆROCARPA, for "Utah" read "Nevada." In note, for "rather large flowers" read "mostly large flowers."

Page 119. Under OPUNTIA ERINACEA, before "berry" insert "dry," and under O. PULCHELLA, before "joints" insert "clustered."

Page 120. Under OPUNTIA ARBORESCENS and O. FRUTESCENS, to the localities add "Northern Mexico."

Page 164. Under CHRYSOPSIS VILLOSA, for "*echinoides*" read "*echioides*."

Page 239. Under MERTENSIA PANICULATA, for (483) read (843.)

Page 267. Under GILIA SCHOTTII, before "3–5-ovuled" insert "cells."

Page 282. Under ASCLEPIAS FASCICULARIS, for "*A. verticillaris*" read "*A. verticillata*."

Page 291. Under OBIONE PHYLLOSTEGIA, for "Utah" read "Central Nevada."

Page 309. Under ERIOGONUM INFLATUM, omit "the segments similar and subequal."

Page 336. For "LEMNA VALDESIANA," read "LEMNA VALDIVIANA, Philippi."

Page 365. Under CAREX BONPLANDII, for "Var. MINOR, Olney," read "Var. MINOR, Boott."

# INDEX.

# INDEX

TO THE

# CATALOGUE AND APPENDIX.


Page.

Abies amabilis, Forbes ........ 333
  Douglasii, Lindl. ........ 334
  Engelmanni, Parry ........ 332
  grandis, Lindl. ........ 334
  Menziesii, Lindl. ........ 333
Abronia, Juss. ........ 284, 474, 476
  arenaria, Menz. ........ 476
  *Crux-Maltæ*, Kell. ........ 286
  cycloptera, Gray ........ 285, 476
  fragrans, Nutt. ........ 284, 476
  mellifera, Dougl. ........ 476
  *micrantha*, Torr. ........ 285
  speciosa, Buckl. ........ 285
  turbinata, Torr. ........ 285, 476
  umbellata, Lam. ........ 285, 476
Acer glabrum, Torr. ........ 52
  grandidentatum, Nutt. ........ 52
  macrophyllum, Pursh ........ 52
  *tripartitum*, Nutt. ........ 52
Accrates decumbens, Decne. ........ 283
  *latifolia*, Torr. ........ 283
Achillea Millefolium, L. ........ 179
Acleisanthes, Gray ........ 474
  anisophylla, Gray ........ 474
  Berlandieri, Gray ........ 474
  crassifolia, Gray ........ 474
  longifolia, Gray ........ 474
Aconitum nasutum, Fisch. ........ 12
Actæa spicata, L. ........ 12
Actinella acaulis, Nutt. ........ 174
  lanata, Pursh ........ 175
  Richardsonii, Nutt. ........ 175
  Torreyana, Nutt. ........ 175
Adiantum Capillus-Veneris, L. ........ 395
  pedatum, L. ........ 395
Æcidium Bahaiæ, B. & C. ........ 414
  crassum, Pers. ........ 414
Agave, L. ........ 497
  heteracantha, Zucc. ........ 497
  *Lecheguilla*, Torr. ........ 497
  *Poselgeri*, Salm. ........ 497
  Utahensis, Eng. ........ 497

Page.

Agaricus —— ? ........ 413
Agrostis canina, L. ........ 377
  elata, Trin. ........ 378
  exarata, Trin. ........ 377
  *microphylla*, Steud. ........ 377
  scabra, Willd. ........ 377
Aira cæspitosa, L. ........ 392
  danthonioides, Trin. ........ 392
ALGÆ ........ 415
*Algarobia*, Benth. ........ 420
Alisma Plantago, L. ........ 340
ALISMACEÆ ........ 340
Allionia, L. ........ 474
  incarnata, L. ........ 474
Allium, L. ........ 485
  acuminatum, Hook. ........ 352, 487
  *amplectens*, Torr. ........ 487
  anceps, Kell. ........ 352, 488
  *angulosum*, Nutt. ........ 486
  attenuifolium, Kell. ........ 486
  atrorubens, S. Watson ........ 352, 487
  Bigelovii, S. Watson ........ 487
  bisceptrum, S. Watson ........ 351, 487
  brevistylum, S. Watson ........ 350, 486
  campanulæflorum, Gey. ........ 488
  Canadense, Kalm. ........ 487
  cernuum, Roth. ........ 486
  croceum, Torr. ........ 488
  Douglasii, Hook. ........ 488
  falcifolium, H. & A. ........ 488
  *maritimum*, Benth. ........ 488
  mutabile, Mx. ........ 487
  Nevadense, S. Watson ........ 487
  *occidentale*, Gray ........ 486
  *ochroleucum*, Nutt. ........ 488
  Palmeri, S. Watson ........ 487
  reticulatum, Fras. ........ 350, 486
  Sanbornii, Wood ........ 486
  scaposum, Benth. ........ 487
  Schœnoprasum, L. ........ 485
  serratum, S. Watson ........ 487
  stellatum, Fras. ........ 486

Page.
Allium, L. 485
striatum, Jacq. 488
tribracteatum, Torr. 353, 488
tricoccum, Ait. 485
unifolium, Kell. 486
validum, S. Watson 350, 486
*Allosorus achrostichoides*, Spreng. 396
*Aloe yuccæfolia*, Gray 497
Alnus incana, Willd. 322
rubra, Bong. 324
serrulata, L. 324
Alopecurus aristulatus, Mx. 375
geniculatus, L. 375
Alternanthera, Mart. 297
lanuginosa, Torr. 297
AMARANTACEÆ 296
Amarantus albus, L. 296
paniculatus, L. 296
retroflexus, L. 296
Amblystegium compactum, Müll. 410
noterophilum, Sull. 410
orthocladon, Sull. 410
radicale, Beauv. 410
riparium, L. 410
serpens, Dill. 410
Ambrosia artemisiæfolia, L. 165
*coronopifolia*, T. & G. 165
psilostachya, DC. 165
Amelanchier Canadensis, T. & G. 92
*Amianthium Nuttallii*, Gray 343
Amida, Nutt. 179
gracilis, Nutt. 179
hirsuta, Nutt. 179
Ammannia latifolia, L. 103
Amsinckia, Lehm. 240
angustifolia, Lehm. 240
*intermedia*, F. & M. 240
lycopsoides, Lehm. 240
*Mexicana*, Mart. & Gal. 240
spectabilis, F. & M. 240
Anacalypta latifolia, Nees & Hsch. 399
ANACARDIACEÆ 52
*Anantherix speciosa*, Nutt. 283
Androsace occidentalis, Pursh 213
septentrionalis, L. 213
Androstephium, Torr. 489
violaceum, Torr. 489
*Anemia Californica*, Nutt. 426
Anemone *Caroliniana*, Walt. 5
decapetala, L. 5
*lanigera*, Gay 5
multifida, DC. 5
Anemopsis, Hook. 426
Californica, Hook. 426
Angelica Breweri, Gray 126
pinnata, S. Watson 126
Anisocoma, Gray 197
acaulis, Gray 197
Antennaria alpina, Gærtn. 185

Page.
Antennaria Carpathica, R. Br. 185
dimorpha, T. & G. 186, 422
dioica, Gærtn. 185
margaritacea, R. Br. 185
*Anticlea Fremontii*, Torr. 343
Antirrhinum, Tourn. 449
Breweri, Gray 450
confertiflorum, Benth. 449
Cooperi, Gray 451
cornutum, Benth. 450
Coulterianum, Benth. 450
cyathiferum, Benth. 449
filipes, Gray 451
glandulosum, Lindl. 450
junceum, Gray 451
Kingii, S. Watson 215, 450
leptaleum, Gray 450
maurandioides, Gray 451
Nuttallianum, Benth. 450
speciosum, Gray 451
strictum, Gray 451
vagans, Gray 216, 450
Virga, Gray 450
Aphyllon fasciculatum, T. & G. 215
uniflorum, T. & G. 215
APOCYNACEÆ 282
Apocynum androsæmifolium, L. 282
cannabinum, L. 282
Aplopappus, Cass. 158
acaulis, Gray 161
apargioides, Gray 161
Bloomeri, Gray 158
lanceolatus, T. & G. 160
Macronema, Gray 159
nanus, D. C. Eaton 159
Nuttallii, T. & G. 163
paniculatus, Gray 162
Parryi, Gray 162
sphærocephalus, Harv. & Gray 163
spinulosus, DC. 422
suffruticosus, Gray 159
tenuicaulis, D. C. Eaton 160
uniflorus, T. & G. 161
Aquilegia cærulea, James 10
*Californica*, Lindl. 10
Canadensis, L. 10
eximia, Van Houtte 10
flavescens, S. Watson 10
truncata, F. & M. 10
Arabis arcuata, Gray 18
canescens, Nutt. 16, 17
Drummondii, Gray 17, 18
hirsuta, Scop. 16
longirostris, S. Watson 17
mollis 18
*patula*, Torr. 18
perfoliata, Lam. 17
platysperma, Gray 16
*puberula*, Nutt. 16

Page.
Arabis retrofracta, Grah. .................. 18
Archangelica Gmelini, DC. .................. 127
officinalis, Hoff. .................. 127
Arctostaphylos glauca, Lindl. ..................210, 425
pungens, HBK. ..................210, 425
tomentosa, Dougl. .................. 210
Uva-ursi, Spreng. .................. 210
Arenaria aculeata, S. Watson.................. 40
arctica, Stev. .................. 41
congesta, Nutt. ..................39, 40
Fendleri, Gray..................40, 417
formosa, Fisch. ..................39, 40
lateriflora, L. .................. 41
*nardifolia*, Ledeb. .................. 39
pungens, Nutt. .................. 40
verna, L. ..................41, 417
Argemone *hispida*, Gray.................. 13
Mexicana, L. .................. 13
*munita*, Dur. & Hilg. .................. 13
Aristida Fendleriana, Steud. .................. 381
longiseta, Steud. .................. 381
purpurea, Nutt. .................. 381
Arnica *amplexicaulis*, Nutt. .................. 187
angustifolia, Vahl.................. 186
Chammissonis, Less. .................. 187
cordifolia, Hook. .................. 187
latifolia, Bong. .................. 187
longifolia, D. C. Eaton.................. 186
mollis, Hook. .................. 187
montana, L. .................. 187
Artemisia arbuscula, Nutt. .................. 182
biennis, Willd. .................. 183
cana, Pursh.................. 180
discolor, Dougl. .................. 183
*Douglasiana*, T. & G. .................. 183
dracunculoides, Pursh.................. 181
filifolia, Torr. .................. 181
frigida, Willd. .................. 184
Ludoviciana, Nutt. .................. 183
potentilloides, Gray.................. 182
scopulorum, Gray .................. 184
spinescens, D. C. Eaton.................. 180
trifida, Nutt. .................. 182
tridentata, Nutt. .................. 181
Arthrocnemum fruticosum, Moq. .................. 294
ASCLEPIADACEÆ .................. 282
Asclepias cryptoceras, S. Watson.................. 283
*Douglasii*, Hook. .................. 282
fascicularis, Decne. .................. 282
speciosa, Torr. .................. 282
verticillata, L. .................. 282
Aspidium Lonchitis, Swartz.................. 396
Asplenium *angustum*, Willd. .................. 396
Filix-fœmina, Bernh. .................. 396
Aster adscendens, Lindl. .................. 139
æstivus, Ait. .................. 141
Andersonii, Gray.................. 143
Andinus, Nutt. .................. 142
angustus, T. & G. .................. 144

Page.
Aster Bloomeri, Gray.................. 140
*campestris*, Nutt. .................. 140
carneus, Nees.................. 141
Douglasii, Lindl. .................. 141
elegans, T. & G. .................. 144
*Engelmanni*, Gray.................. 144
falcatus, Lindl. ..................140, 141
glacialis, Nutt. .................. 142
glaucus, T. & G. .................. 144
integrifolius, Nutt. .................. 139
Kingii, D. C. Eaton.................. 141
multiflorus, Ait. .................. 141
Nuttallii, T. & G. .................. 139
oblongifolius, Nutt. .................. 140
pulchellus, D. C. Eaton.................. 143
*ramulosus*, Nutt. .................. 140
salsuginosus, Rich. ..................142, 143
simplex, Willd. .................. 140
Astragalus, Tourn. .................. 435
aboriginum, Rich. ..................70, 438
adsurgens, Pall. ..................68, 439
alpinus, L. .................. 438
Andersonii, Gray..................67, 437
aridus, Gray.................. 443
Arizonicus, Gray.................. 437
arrectus, Gray ..................69, 437
*Arthu-Schottii*, Gray..................66, 435
atratus, S. Watson..................69, 437
Beckwithii, T. & G. ..................71, 440
Bigelovii, Gray.................. 436
bisulcatus, Gray .................. 442
Bolanderi, Gray.................. 437
Bourgovii, Gray .................. 444
Brazoensis, Buckl. .................. 436
Breweri, Gray .................. 439
cæspitosus, Gray.................. 445
calycosus, Torr. ..................66, 435
campestris, Gray..................76, 445
Canadensis, L. ..................67, 68, 436
caryocarpus, Ker. .................. 435
*chætodon*, Torr. .................. 435
Chamæleuce, Gray ..................74, 443
Cobrensis, Gray.................. 436
collinus, Dougl. .................. 444
Cooperi, Gray.................. 440
Coulteri, Benth. ..................66, 435
Crotalariæ, Gray.................. 441
curtipes, Gray.................. 441
cyrtoides, Gray..................75, 444
decumbens, Gray.................. 445
diaphanus, Dougl. .................. 446
didymocarpus, H. & A. .................. 436
diphysus, Gray ..................65, 435
distortus, T. & G. .................. 439
*diversifolius*, Gray.................. 77
Douglasii, Gray.................. 441
Drummondii, Dougl. .................. 437
eriocarpus, S. Watson ..................71, 440
Fendleri, Gray.................. 443

Page.

Astragalus, filipes, Torr. 75, 444
flavus, Nutt. 437
flexuosus, Dougl. 443
*Fremontii*, T. & G. 66
frigidus, Gray 442
Geyeri, Gray 72, 440
Gibbsii, Kell. 446
glaber, Mx. 439
glabriusculus, Gray 439
glareosus, Dougl. 440
gracilentus, Gray 443
gracilis, Nutt 438
Hallii, Gray 443
Hartwegi, Benth. 436
Hookerianus, Gray 73, 441
Hornii, Gray 441
humistratus, Gray 437
hypoglottis, L. 68, 436
*ineptus*, Gray 66
inflexus, Dougl. 440
iodanthus, S. Watson 70, 71, 440
jejunus, S. Watson 73, 442
junceus, Gray 76, 445
Kentrophyta, Gray 77, 445
lentiginosus, Dougl. 65, 66, 435
leptaleus, Gray 442
leptocarpus, T. & G. 437
leucopsis, T. & G. 441
leucophyllus, T. & G. 442
Lindheimeri, Eng. 439
lonchocarpus, T. & G. 442
lotiflorus, Hook. 439
Lyallii, Gray 435
macrodon, Gray 441
malacus, Gray 67, 437
megacarpus, Gray 441
Menziesii, Gray 441
Mexicanus, DC. 435
microcystis, Gray 442
microlobus, Gray 438
miser, Dougl. 444
Missouriensis, Nutt. 440
mollissimus, Torr. 436
*Mortoni*, Nutt. 68
multiflorus, Gray 75, 444
nothoxys, Gray 446
nudus, S. Watson 74, 443
Nuttallianus, DC. 68, 436
obcordatus, Ell. 439
obscurus, S. Watson 69, 437
oocarpus, Gray 440
oophorus, S. Watson 73, 441
Oreganus, Nutt. 438
oroboides, Hornem. 438
oxyphysus, Gray 442
Palmeri, Gray 445
Palliseri, Gray 444
Parryi, Gray 440
pauciflorus, Hook. 444

Page.

Astragalus, pectinatus, Dougl. 443
pictus, Gray 441
Plattensis, Nutt. 435
platytropis, Gray 66, 435
polaris, Benth. 446
porrectus, S. Watson 75, 444
Preussii, Gray 443
pterocarpus, S. Watson 71, 439
pubentissimus, T. & G. 439
Purshii, Dougl. 72, 440
pycnostachius, Gray 443
racemosus, Pursh 437
reflexus, T. & G. 436
Robbinsii, Gray 70, 438
sclerocarpus, Gray 444
sericoleucus, Gray 445
serotinus, Gray 445
Shortianus, Nutt. 440
simplicifolius, Gray 77, 445
Sonoræ, Gray 443
Spaldingii, Gray 435
sparsiflorus, Gray 439
speirocarpus, Gray 74, 444
stenophyllus, T. & G. 444
succumbens, Dougl. 437
tegetarius, S. Watson 76, 444
tener, Gray 437
tephrodes, Gray 443
Thurberi, Gray 442
trichopodus, Gray 442
tridactylicus, Gray 445
triflorus, Gray 440
triphyllus, Pursh. 445
Utahensis, T. & G. 72, 440
vaccarum, Gray 436
vaginatus, Pall. 446
villosus, Mx. 439
Whitneyi, Gray 441
Wrightii, Gray 436
Atropis Californica, Munro 387, 388
*distans*, Griseb. 385
Audibertia, Benth. 235
incana, Benth. 235
Aulacomnion androgynum, Dill. 407
palustre, Dill. 407
Avena fatua, L. 392
sativa, L. 392
Bahia, Lag 173
rubella, Gray 174
Wallacei, Gray 174
leucophylla, DC. 173
Baileya, Harv. & Gray 425
pleniradiata, Harv. & Gray 425
Balsamorrhiza, Hook. 167
hirsuta, Nutt. 167
Hookeri, Nutt. 167
macrophylla, Nutt. 168
sagittata, Nutt. 168
*Banalia occidentalis*, Moq. 297

| | Page. |
|---|---|
| Barbarea vulgaris, R. Br. | 16 |
| Barbula brevipes, Lesqx. | 400 |
| lævipila, Br. & Sch. | 400 |
| Mülleri, Bruch. | 400 |
| ruralis, Dill. | 400 |
| subulata, Dill. | 400 |
| Batrachospermum vagum, Kütz | 415 |
| Beckmannia, Host. | 393 |
| erucæformis, Host. | 393 |
| BERBERIDEÆ | 13 |
| Berberis Aquifolium, Pursh | 13 |
| Fremontii, Torr. | 416 |
| pinnata, Lag. | 13 |
| *repens*, Lindl. | 13 |
| Bergia, L. | 45 |
| Texana, Seub. | 45 |
| Bessera, Schult. | 489 |
| elegans, Schult. | 489 |
| Betula alba, L. | 323 |
| glandulosa, Mx. | 323 |
| occidentalis, Hook. | 323 |
| papyracea, Ait. | 323 |
| BETULACEÆ | 323 |
| Biatora decipiens, Fr. | 413 |
| globifera, Fr. | 413 |
| Russellii, Tuck. | 413 |
| Blepharipappus, Hook. | 176 |
| scaber, Hook. | 176 |
| Blitum capitatum, L. | 288 |
| Nuttallianum, R. & S. | 288 |
| polymorphum, C. A. Mey. | 288 |
| *rubrum*, Reich. | 288 |
| Bloomeria aurea, Kell. | 488 |
| Boerhaavia, L. | 475 |
| BORRAGINACEÆ | 238 |
| Brachythecium albicans, Neck. | 409 |
| asperrimum, Mitt. | 409 |
| collinum, Schl. | 409 |
| lætum, Br. & Sch. | 409 |
| rivulare, Br. & Sch. | 409 |
| rutabulum, L. | 408 |
| salebrosum, Hoffm. | 409 |
| Utahense, James | 409 |
| Brassica campestris, L. | 28 |
| nigra, Benth. & Hook. | 28 |
| *Brevoortia*, Wood. | 353, 490 |
| *Ida-Maia*, Wood | 490 |
| Brizopyrum spicatum, Hook. | 385 |
| Brickellia, Ell. | 137 |
| atractyloides, Gray | 138 |
| Californica, Gray | 138 |
| grandiflora, Nutt. | 138 |
| linifolia, D. C. Eaton | 137 |
| microphylla, Gray | 138 |
| oblongifolia, Nutt. | 137 |
| spinulosa, Gray | 139 |
| *tenera*, Gray | 138 |
| Brodiæa, Smith | 353, 489 |
| *capitata*, Benth. | 490 |
| coccinea, Gray | 490 |
| Brodiæa congesta, Sm. | 489 |
| grandiflora, Sm. | 353, 489 |
| multiflora, Benth. | 353, 489 |
| *parviflora*, Torr. | 353 |
| volubilis, Baker | 489 |
| Bromus breviaristatus, Thurb. | 389 |
| ciliatus, L. | 390 |
| *strigosus*, Bieb. | 390 |
| Brunella vulgaris, L. | 236 |
| Bryum argenteum, L. | 406 |
| atropurpureum, Web. & Mohr | 406 |
| bimum, Schreb. | 405 |
| cæspiticium, L. | 406 |
| capillare, Hedw. | 406 |
| Duvallii, Voit. | 406 |
| inclinatum, Swtz. | 405 |
| intermedium, Web. & Mohr | 405 |
| torquescens, Br. & Sch. | 406 |
| pallescens, Schwg. | 406 |
| pendulum, Hsch. | 405 |
| turbinatum, Hedw. | 406, 407 |
| Buellia geographica, Tuck. | 413 |
| Montagnæi, Tuck. | 413 |
| Burrielia, DC. | 174 |
| lanosa, Gray | 174 |
| nivea, D. C. Eaton | 174 |
| CACTACEÆ | 115 |
| Calais, DC. | 196 |
| linearifolia, DC. | 196 |
| macrochæta, Gray | 196 |
| major, Gray | 197 |
| nutans, Gray | 196 |
| Calamagrostis Lapponica, Trin. | 379 |
| stricta, Trin. | 379 |
| sylvatica, DC. | 379 |
| *Calliprora*, Lindl. | 490 |
| Callitriche autumnalis, L. | 102 |
| verna, L. | 102 |
| Calochortus, Pursh | 347 |
| eurycarpus, S. Watson | 348 |
| Gunnisoni, S. Watson | 348 |
| Nuttallii, T. & G. | 347 |
| venustus, Benth. | 348 |
| Caltha leptosepala, DC. | 10 |
| Calyptridium, Nutt. | 44 |
| roseum, S. Watson | 44 |
| Calystegia sepium, L. | 273 |
| Camassia, Lindl. | 349 |
| esculenta, Lindl. | 349 |
| Campanula Langsdorffiana, Fisch. | 208 |
| linifolia, Lam. | 208 |
| rotundifolia, L. | 208 |
| uniflora, L. | 208 |
| CAMPANULACEÆ | 208 |
| Camptothecium Nevadense, Lesqx. | 410 |
| Cantharellus aurantiacus, Fr. | 413 |
| CAPPARIDEÆ | 32 |
| CAPRIFOLIACEÆ | 132 |
| Capsella Bursa-pastoris, Moench. | 28 |
| divaricata, Walp. | 28 |

| | Page. |
|---|---|
| Cardamine cordifolia, Gray | 19 |
| hirsuta, L. | 20 |
| Carex æmathorhynchus, Desv. | 373 |
| affinis, R. Br. | 362 |
| ampullacea, Good | 374 |
| angustifolia, Sm. | 368 |
| aquatilis, Wahl. | 368 |
| aristata, R. Br. | 374 |
| athrostachya, Olney | 366 |
| atrata, L. | 371 |
| aurea, Nutt. | 371 |
| *Backana*, Dew. | 361 |
| Bonplandii, Kth. | 365 |
| Brogniartii, Kth. | 364 |
| Buxbaumii, Wahl. | 371 |
| canescens, L. | 364 |
| capillaris, L. | 373 |
| compacta, R. Br. | 370 |
| concinna, R. Br. | 372 |
| disticha, Huds. | 362 |
| Douglasii, Boott | 363 |
| elongata, L. | 365 |
| festiva, Dew. | 366 |
| filifolia, Nutt. | 362 |
| filiformis, L. | 374 |
| frigida, All. | 371 |
| Geyeri, Boott | 372 |
| Grahamii, Boott | 371 |
| Haydeniana, Olney | 366 |
| Hoodii, Boott | 364 |
| Hookeriana, Dew. | 362 |
| *irrigua*, Sm. | 371 |
| Jamesii, Torr. | 368 |
| laciniata, Boott | 369 |
| lagopina, Wahl. | 365 |
| lanuginosa, Mx. | 373 |
| leporina, L. | 365 |
| Liddoni, Boott | 367 |
| limula, Fries | 367 |
| *Lyallii*, Boott | 372 |
| Lyoni, Boott | 362 |
| Magellanica, Lam. | 371 |
| marcida, Boott | 363 |
| *Meekii*, Dew. | 363 |
| microglochin, Wahl. | 362 |
| muricata, L. | 362 |
| *Nebraskensis*, Dew. | 368 |
| nigricans, C. A. Meyer | 361 |
| *nigricans*, Torr. | 361 |
| *Nuttallii*, Dew. | 363 |
| obtusata, Lilj. | 362 |
| *Pardiei*, Boott | 365 |
| *petasata*, Dew. | 363 |
| *phyllostachya*, Dew. | 372 |
| Prescottiana, Boott | 369 |
| *pulla*, Good | 370 |
| Pyrenaica, Wahl. | 361 |
| *Pyrenaica*, Torr. | 361 |
| Raynoldsii, Dew. | 372 |
| rigida, Good | 370 |
| Carex Rossii, Boott | 373 |
| *rupestris*, Dew. | 361 |
| saxatilis, Good | 370 |
| Schottii, Dew. | 370 |
| scirpoidea, Mx. | 362 |
| *siccata*, Dew. | 363 |
| *Sitchensis*, Dew. | 369 |
| stipata, Muhl. | 362 |
| straminea, Schk. | 367 |
| tenella, Schk. | 364 |
| utriculata, Boott | 374 |
| vesicaria, L. | 374 |
| vitilis, Fries | 364 |
| vulgaris, Fries | 368 |
| Watsoni, Olney | 370 |
| *Wilkesii*, Torr. | 369 |
| ——— ? | 369 |
| Carum, L. | 121 |
| Gairdneri, Benth. & Hook. | 121 |
| CARYOPHYLLACEÆ | 36 |
| *Castanea chrysophylla*, Hook. | 322 |
| Castanopsis, Spach. | 322 |
| chrysophylla, DC. | 322 |
| Castilleia, Mutis. | 456 |
| affinis, H. & A. | 228, 456 |
| breviflora, Gray | 457 |
| coccinea, Spreng. | 456 |
| flava, S. Watson | 230, 456 |
| foliolosa, H. & A. | 456 |
| indivisa, Eng. | 456 |
| integra, Gray | 456 |
| lanata, Gray | 456 |
| latifolia, H. & A. | 456 |
| laxa, Gray | 456 |
| linariæfolia, Benth. | 228, 456 |
| pallida, Kth. | 229, 456 |
| parviflora, Bong. | 229, 456 |
| purpurea, Don | 456 |
| sessiliflora, Pursh | 457 |
| Catabrosa, Beauv. | 385 |
| aquatica, Beauv. | 385 |
| Caulanthus, S. Watson | 27 |
| Coulteri, S. Watson | 27 |
| crassicaulis, S. Watson | 27 |
| hastatus, S. Watson | 28 |
| pilosus, S. Watson | 27 |
| procerus, S. Watson | 27 |
| Ceanothus *cordulatus*, Kell. | 51 |
| cuneatus, Nutt. | 419 |
| divaricatus, Nutt. | 51 |
| Greggii, Gray | 418 |
| prostratus, Benth. | 51 |
| sorediatus, H. & A. | 51 |
| velutinus, Dougl. | 51 |
| CELASTRINEÆ | 50 |
| Celtis occidentalis, L. | 321 |
| pallida, Torr. | 321 |
| Cenchrus tribuloides, L. | 394 |
| Centrostegia, Gray | 476 |
| Thurberi, Gray | 476 |

Page.
Centrostegia leptoceras, Gray ...... 476
Cerastium arvense, L. ...... 38, 417
nutans, Raf. ...... 38
vulgatum, L. ...... 38
*Cerasus demissus*, Nutt. ...... 80
*emarginatus*, Dougl. ...... 79
*mollis*, Dougl. ...... 79
*Ceratochloa breviaristata*, Hook. ...... 389
Ceratodon purpureus, Dill. ...... 400
CERATOPHYLLACEÆ ...... 319
Ceratophyllum demersum, L. ...... 319
Cercocarpus, HBK. ...... 82
breviflorus, Gray ...... 83
ledifolius, Nutt. ...... 83, 420
parvifolius, Nutt. ...... 82
Cereus, Eng. ...... 117
Engelmanni, Parry ...... 117
viridiflorus, Eng. ...... 118
Chænactis, DC. ...... 171
*achilleæfolia*, H. & A. ...... 172
carphoclinia, Gray ...... 172
Douglasii, H. & A. ...... 172
macrantha, D. C. Eaton ...... 171
stevioides, H. & A. ...... 172, 424
Xantiana, Gray ...... 171
Chara, Ag. ...... 398
fœtida, A. Br. ...... 398
fragilis, Desv. ...... 398
*vulgaris*, Auct. ...... 398
CHARACEÆ ...... 398
Cheilanthes lanuginosa, Nutt. ...... 395
Cheiranthus, L. ...... 14
Menziesii, Benth. & Hook. ...... 14
CHENOPODIACEÆ ...... 287
*Chenopodina depressa*, Moq. ...... 294
*linearis*, Moq. ...... 295
Chenopodium album, L. ...... 287
Botrys, L. ...... 288
Frémonti, S. Watson ...... 287
*humile*, Hook. ...... 288
hybridum, L. ...... 287
Chimaphila umbellata, Nutt. ...... 212
Chorizanthe, R. Br. ...... 312, 476, 484
brevicornu, Torr. ...... 312, 484
Californica, Gray ...... 485
corrugata, T. & G. ...... 485
diffusa, Benth. ...... 484
Douglasii, Benth. ...... 484
fimbriata, Nutt. ...... 484
laciniata, Torr. ...... 484
membranacea, Benth. ...... 484
perfoliata, Gray ...... 312, 485
polygonoides, T. & G. ...... 485
procumbens, Nutt. ...... 484
pungens, Benth. ...... 484
rigida, Torr. ...... 312, 485
staticoides, Benth. ...... 484
stellulata, Benth. ...... 484
uniaristata, T. & G. ...... 484
Watsoni, T. & G. ...... 313, 485

Page.
Chrysopsis *canescens*, T. & G. ...... 164
*echioides*, Benth. ...... 164
*foliosa*, Nutt. ...... 164
hispida, DC. ...... 164
villosa, Nutt. ...... 164, 422
Cicuta maculata, L. ...... 121
Circæa alpina, L. ...... 113
Cirsium *acaule*, Gray ...... 195
Coulteri, Harv. & Gray ...... 195
Drummondii, T. & G. ...... 195
*edule*, Nutt. ...... 194
eriocephalum, Gray ...... 196
foliosum, DC. ...... 194
undulatum, Spreng. ...... 194, 422
Cladonia fimbriata, Fr. ...... 413
pyxidata, Fr. ...... 413
Clarkia, Pursh ...... 104
rhomboidea, Dougl. ...... 104
Clavaria aurea, Schæff. ...... 414
formosa, Pers. ...... 414
fumosa, Pers. ...... 414
Claytonia *aquatica*, Nutt. ...... 43
arctica, Adams ...... 43
Caroliniana, Mx. ...... 42
Chamissonis, Esch. & Ledeb. ...... 43
*lanceolata*, Pursh ...... 42
perfoliata, Don ...... 43
umbellata, S. Watson ...... 43
Cleome, L. ...... 32
aurea, Nutt. ...... 32
integrifolia, T. & G. ...... 32
*lutea*, Hook. ...... 32
sparsifolia, S. Watson ...... 32
——? ...... 32
Cleomella, DC. ...... 33
angustifolia, Torr. ...... 33
longipes, Torr. ...... 33
Mexicana, DC. ...... 33
parviflora, Gray ...... 33
plocasperma, S. Watson ...... 33
*tenuifolia* ...... 33
Clematis alpina, Mill. ...... 3
*Columbiana*, T. & G. ...... 4
Douglasii, Hook. ...... 3
ligusticifolia, Nutt. ...... 3
*Ochotensis*, Poir. ...... 4
*Sibirica*, Mill. ...... 4
verticillaris, DC. ...... 4
*Wyethii*, Nutt. ...... 3
*Clintonia*, Lindl. ...... 208
Coldenia, L. ...... 247
canescens, DC. ...... 247
hispidissima, Gray ...... 247
Nuttallii, Hook. ...... 247, 248
Palmeri, Gray ...... 248
procumbens, L. ...... 247
Collinsia parviflora, Dougl. ...... 216
Collomia, Nutt. ...... 261, 462, 464
Cavanillesiana, Don ...... 465
gilioides, Benth. ...... 464

Page.
Collomia gracilis, Dougl. ....262, 464
grandiflora, Dougl. ....261, 464
heterophylla, Hook. .... 465
leptalea, Gray ....262, 465
linearis, Nutt. ....261, 464
longiflora, Gray .... 465
tenella, Gray ....262, 464
Thurberi, Gray .... 465
Comandra pallida, DC. .... 319
umbellata, Nutt. .... 319
COMMELYNACEÆ .... 359
COMPOSITÆ .... 136
Conanthus, S. Watson .... 256
aretioides, S. Watson .... 256
CONIFERÆ .... 330
CONVOLVULACEÆ .... 273
Corallorhiza multiflora, Nutt. .... 342
Cordylanthus, Nutt. ....231, 459
canescens, Gray ....233, 460
capitatus, Nutt. ....231, 459
filifolius, Nutt. .... 459
Kingii, S. Watson ....233, 460
laxiflorus, Gray ....232, 460
maritimus, Nutt. .... 460
mollis, Gray .... 460
pilosus, Gray .... 459
ramosus, Nutt. ....232, 459
tenuis, Gray ....232, 460
Wrightii, Gray .... 459
Coriandrum sativum, L. .... 131
Corispermum hyssopifolium, L. .... 293
CORNACEÆ .... 131
Cornus pubescens, Nutt. .... 131
sericea, L. .... 132
Corydalis aurea, Willd. .... 14
Cowania, Don .... 83
Mexicana, Don .... 83
*Stansburiana*, Torr. .... 83
CRASSULACEÆ .... 101
Cratægus *Douglasii*, Lehm. .... 92
rivularis, Nutt. .... 92
sanguinea, Pall. .... 92
Crepis, L. .... 202
acuminata, Nutt. ....203, 204
Andersonii, Gray .... 203
glauca, T. & G. .... 203
occidentalis, Nutt. ....203, 422
runcinata, T. & G. .... 202
Cressa, L. .... 273
Cretica, L. .... 273
Croton procumbens, Esch. .... 320
CRUCIFERÆ .... 14
Cryptogramme achrostichoides, R. Br. .... 396
CUPULIFERÆ .... 321
Cuscuta, Tourn. .... 471
applanata, Eng. .... 471
arvensis, Beyr. .... 471
Californica, Chois. ....273, 471
chlorocarpa, Eng. .... 471
compacta, Juss. .... 472

Page.
Cuscuta cuspidata, Eng. .... 472
decora, Chois. & Eng. .... 472
exaltata, Eng. .... 472
glomerata, Chois. .... 472
Gronovii, Willd. .... 472
inflexa, Eng. .... 472
leptantha, Eng. .... 471
obtusiflora, HBK. .... 471
odontolepis, Eng. .... 471
rostrata, Shuttl. .... 472
squamata, Eng. .... 472
subinclusa, Dur. & Hilg. ....274, 472
tenuiflora, Eng. ....273, 471
umbellata, Kth. .... 471
*Cyclobothra*, Sweet .... 347
Cymopterus, Raf. .... 123
anisatus, Gray .... 125
fœniculaceus, Nutt. .... 124
glaucus, Nutt. .... 124
longipes, S. Watson .... 124
montanus, Nutt. ....123, 124
nivalis, S. Watson .... 123
terebinthinus, T. & G. .... 125
*Cynapium apiifolium*, Nutt. .... 125
CYPERACEÆ .... 360
Cyperus aristatus, Rottb. .... 360
inflexus, Muhl. .... 359
phymatodes, Muhl. .... 360
Cystopteris fragilis, Bernh. .... 396
Dædalea ——? .... 414
Dalea Frémontii, Torr. .... 65
Kingii, S. Watson .... 64
Johnsoni, S. Watson .... 64
lanata, Spreng. .... 419
*lanuginosa*, Nutt. .... 419
polydenia, Torr. .... 64
Danthonia Californica, Bol. .... 392
Datura meteloides, DC. .... 425
Stramonium, L. .... 276
Delphinium depauperatum, Nutt. .... 12
elatum, L. .... 11
Menziesii, DC. ....11, 12
scopulorum, Gray .... 11
Desmatodon cernuus, Wahl. .... 399
flavicans, Br. & Sch. .... 399
latifolius, Br. & Sch. .... 399
*Dichæta*, Nutt. .... 174
*Dichelostemma*, Kth. .... 353
Didymodon cylindricus, Nees & Hsch. .... 399
rubellus, Roth. .... 399
*Dieteria incana*, T. & G. .... 147
viscosa, Nutt. .... 147
Diplopappus alpinus, Nutt. .... 147
ericoides, T. & G. .... 147
Distichium capillaceum, Hedw. .... 400
inclinatum, Swartz .... 400
Dodecatheon *frigidum*, Ch. & Sch. .... 214
Meadia, L. .... 214
*Donia uniflora*, Hook. .... 161
Downingia, Torr. .... 208

Page.
Downingia pulchella, Torr. 208
Draba *algida*, Adams 21
alpina, L. 20, 21
aurea, Vahl 22
Caroliniana, Walt. 23
Douglasii, Gray 22
*glacialis*, Adams 21
muricella, Wahl. 21
nemorosa, L. 22
*nivalis*, Lilj. 22
stellata, Jacq. 21
Dracocephalum parviflorum, Nutt. 236
Dryas Drummondii, Rich. 84
octopetala, L. 84
Eatonia obtusata, Gray 383
Echinocactus, Link & Otto 116
Johnsoni, Parry 117
polyancistrus, Eng. & Big. 116
polycephalus, Eng. & Big. 117, 421
pubispinus, Eng. 117
Simpsoni, Eng. 116
Whipplei, Eng. & Big. 116
Echinospermum deflexum, Lehm. 245
*floribundum*, Lehm. 246
patulum, Lehm. 246
Redowskii, Lehm. 246
*strictum*, Nees 247
*Eddya hispidissima*, Torr. 247
*Edosmia Gairdneri*, T. & G. 121
Elatine Americana, Arn. 45
*Texana*, T. & G. 45
ELATINEÆ 45
ELEAGNACEÆ 318
Eleagnus, L. 318
argentea, Pursh 318
Eleocharis acicularis, R. Br. 360
palustris, R. Br. 360
Elymus condensatus, Presl 391
Sitanion, Schult. 391
Emmenanthe, Benth. 256
glaberrima, Torr. 257
glandulifera, Torr. 257
parviflora, Gray 257
penduliflora, Benth. 256
Encalypta rhabdocarpa, Schwæg. 401
vulgaris, L. 400
Encelia ——? 423
Endocarpon miniatum, Schær. 413
Ephedra, L. 328
antisyphilitica, C. A. Mey. 328
*pedunculata*, Eng. 330
trifurca, Torr. 329
Epilobium alpinum, L. 103, 421
angustifolium, L. 104
coloratum, Muhl. 103
obcordatum, Gray 104
paniculatum, Nutt. 103
tetragonum, L. 103
Epipactis, Hall 341
gigantea, Dougl. 341

Page.
EQUISETACEÆ 394
Equisetum arvense, L. 394
hiemale, L. 394
lævigatum, A. Br. 394
robustum, A. Br. 394
Eragrostis poæoides, Beauv. 388
Purshii, Bernh. 388
Eremochloe, S. Watson 382
Bigelovii, S. Watson 382
Kingii, S. Watson 382
ERICACEÆ 209
*Ericameria*, Nutt. 158
*nana*, Nutt. 159
Erigeron acre, L. 149
Bellidiastrum, Nutt. 150, 422
bellidifolium, Muhl. 151
Bloomeri, Gray 148
Breweri, Gray 151
cæspitosum, Nutt. 153
Canadense, L. 147
compositum, Pursh 147, 148
concinnum, T. & G. 151, 422
glabellum, Nutt. 150
grandiflorum, Hook. 148
lonchophyllum, Hook. 149
macranthum, Nutt. 150
nanum, Nutt. 153
ochroleucum, Nutt. 152
pumilum, Nutt. 151, 422
*racemosum*, Nutt. 149
stenophyllum, D. C. Eaton 152
uniflorum, L. 149
ursinum, D. C. Eaton 148
Eriocoma, Nutt. 379
cuspidata, Nutt. 379
ERIOGONEÆ 476
Eriogonum, Mx. 298, 476, 477
Abertianum, Torr. 483
acaule, Nutt. 300, 479
alatum, Torr. 477
*Andinum*, Nutt. 299
angulosum, Benth. 309, 483
androsaceum, Benth. 478
annuum, Nutt. 480
atrorubens, Eng. 477
brachypodum, T. & G. 482
brevicaule, Nutt. 304, 480
cæspitosum, Nutt. 298, 478
cernuum, Nutt. 308, 482
ciliatum, Torr. 483
cinereum, Benth. 480
compositum, Dougl. 478
corymbosum, Benth. 303, 480
dasyanthum, T. & G. 481
deflexum, Torr. 306, 482
dichotomum, Dougl. 481
divaricatum, Hook. 310, 483
Douglasii, Benth. 478
elatum, Dougl. 302, 479
elongatum, Benth. 481

Page.

Eriogonum ericæfolium, T. & G. ........ 480
fasciculatum, Benth. ........ 302, 480
flavum, Nutt. ........ 477
glandulosum, Benth. ........ 482
Gordoni, Benth. ........ 483
gracile, Benth. ........ 305, 481
Greggii, T. & G. ........ 483
Heermanni, Dur. & Hilg. ........ 306, 481
heracleoides, Nutt. ........ 299, 478
hieracifolium, Benth. ........ 477
incanum, T. & G. ........ 478
inflatum, Torr. ........ 309, 482
intricatum, Benth. ........ 481
Jamesii, Benth. ........ 477
Kellogii, Gray ........ 478
Kingii, T. & G. ........ 301, 479
lachnogynum, Torr. ........ 479
latifolium, Sm. ........ 479
Lobbii, T. & G. ........ 300, 479
lonchophyllum, T. & G. ........ 480
longifolium, Nutt. ........ 477
marifolium, T. & G. ........ 478
microthecum, Nutt. ........ 480
multiflorum, Benth. ........ 480
multiceps, Nees ........ 479
niveum, Dougl. ........ 481
nudum, Dougl. ........ 479
nutans, T. & G. ........ 307, 482
oblongifolium, Benth. ........ 479
ovalifolium, Nutt. ........ 301, 479
parvifolium, Sm. ........ 480
pauciflorum, Pursh ........ 479
pharnaceoides, Torr. ........ 483
Plumatella, Dur. & Hilg. ........ 306, 481
polyanthum, Benth. ........ 478
polycladon, Benth. ........ 481
proliferum, T. & G. ........ 479
pusillum, T. & G. ........ 308, 482
pyrolæfolium, Hook. ........ 478
racemosum, Nutt. ........ 304, 481
reniforme, Torr. ........ 308, 482
rotundifolium, Benth. ........ 482
salsuginosum, Hook. ........ 310, 483
spergulinum, Gray ........ 310, 483
sphærocephalum, Dougl. ........ 299, 478
strictum, Benth. ........ 481
tenellum, Torr. ........ 483
Thomasii, Torr. ........ 482
Thurberi, Torr. ........ 482
thymoides, Hook. ........ 477
tomentosum, Mx. ........ 477
Torreyanum, Gray ........ 478
trichopodum, Torr. ........ 309, 482
truncatum, T. & G. ........ 480
umbellatum, Torr. ........ 300, 478
undulatum, Benth. ........ 477
vimineum, Dougl. ........ 305, 481
virgatum, Benth. ........ 481
Watsonii, T. & G. ........ 307, 482
Wrightii, Torr. ........ 305, 481

Page.

Erisymum asperum, DC. ........ 24
cheiranthoides, L. ........ 24
*pumilum*, Nutt. ........ 24
Eritrichium, Schrad. ........ 241
angustifolium, Torr. ........ 241
Californicum, DC. ........ 242
*Chorisianum*, DC. ........ 242
*connatifolium*, Kell. ........ 242
*fulvocanescens*, Gray ........ 243
fulvum, DC. ........ 243
glomeratum, DC. ........ 242
Kingii, S. Watson ........ 243
leiocarpum, S. Watson ........ 244
micranthum, Torr. ........ 244
muriculatum, Torr. ........ 245
pterocaryum, Torr. ........ 245
*Scouleri*, DC. ........ 242
villosum, DC. ........ 241
Erodium cicutarium, L'Her. ........ 50
Erythræa Chilensis, Pers. ........ 277
Nuttallii, S. Watson ........ 276
Erythronium *giganteum*, Lindl. ........ 348
grandiflorum, Pursh ........ 348
Eschscholtzia, Cham. ........ 13
Californica, Cham. ........ 13, 14
Eunanus, DC. ........ 226
Bigelovii, Gray ........ 226
Coulteri, Benth. ........ 226
Douglasii, Benth. ........ 226
Frémonti, DC. ........ 226
Tolmiei, DC. ........ 226
Eupatorium occidentale, Hook. ........ 136
Euphorbia dictyosperma, F. & M. ........ 320
glyptosperma, Eng. ........ 320
montana, Eng. ........ 320
ocellata, Dur. & Hilg. ........ 319
polygonifolia, L. ........ 319
serpyllifolia, Pers. ........ 320
EUPHORBIACEÆ ........ 319
Eurotia, Adans. ........ 292
ceratoides, Ledeb. ........ 292
lanata, Moq. ........ 292
Eurynchium diversifolium, Schl. ........ 408
strigosum, Hedw. ........ 408
*Eutoca aretioides*, H. & A. ........ 254, 256, 258
*heterophylla*, Torr. ........ 252
*Menziesii*, R. Br. ........ 252
*sericea*, Grah. ........ 252
Evernia vulpina, Ach. ........ 412
Fagonia, L. ........ 418
Californica, Benth. ........ 418
Fegatella conica, Corda ........ 411
*Fendleria*, Steud. ........ 379
Ferula, L. ........ 127
dissecta, Gray ........ 128
multifida, Gray ........ 127
Festuca *brevifolia*, R. Br. ........ 389
microstachys, Nutt. ........ 388
ovina, L. ........ 389
tenella, Willd. ........ 388

Page.
Festuca ——— ? 389
FICOIDEÆ 120
FILICES 395
Fimbriaria tenella, Nees 411
Fimbristylis spadicea, Vahl 361
thermalis, S. Watson 360
Fissidens grandifrons, Brid. 398
Flœrkia proserpinacoides, Willd. 50
Fontinalis antipyretica, L. 408
Fragaria vesca, L. 85
Virginiana, Ehrh. 85
Franseria, Cav. 165
dumosa, Gray 422
Hookeriana, Nutt. 165
Frasera albomarginata, S. Watson 280
speciosa, Dougl. 279
Fraxinus anomala, Torr. 283
viridis, Mx. 284
*Frémontia vermicularis*, Torr. 295
Fritillaria, Tourn. 346
atropurpurea, Nutt. 346
Kamtschatcensis, Fisch. 347
lanceolata, Pursh 347
pudica, Spreng. 347
Funaria Hibernica, Hook. 404
hygrometrica, Hedw. 404
FUNGI 413
Gaillardia, Foug. 424
pinnatifida, Torr. 424
*Galapagoa*, Hook. 247
Galium Aparine, L. 134
asperrimum, Gray 134
bifolium, S. Watson 134
Bloomeri, Gray 135
boreale, L. 136
*hypotrichium*, Gray 135
multiflorum, Kell. 135
trifidum, L. 135
triflorum, Mx. 135
Garrya, Dougl. 132
elliptica, Lindl. 132, 421
laurifolia, Benth. 421
——— ? 421
Gaultheria Myrsinites, Hook. 210
Gaura parviflora, Dougl. 113
Gayophytum, Juss. 105
*cæsium*, T. & G. 105
diffusum, T. & G. 105
*Nuttallii*, T. & G. 105
racemosum, T. & G. 105
ramosissimum, T. & G. 105
Gentiana *acuta*, Mx. 277
affinis, Sm. 279
Amarella, L. 277
*crinita*, Frœl. 278
detonsa, Fries 278
frigida, Hænke 278
heterosepala, Eng. 278
Parryi, Eng. 279
*tenuis*, Griseb. 277

Page.
GENTIANACEÆ 276
GERANIACEÆ 49
Geranium *albiflorum*, Hook. 49
Carolinianum, L. 50
Frémontii, Torr. 49
Richardsonii, F. & M. 49
Geum macrophyllum, Willd. 84
Rossii, Seringe 84
triflorum, Pursh 84
Gilia, Ruiz & Pav. 262, 462, 465
achilleæfolia, Benth. 469
aggregata, Spreng. 269, 469
androsacea, Steud. 263, 466
atractyloides, Gray 467
aurea, Nutt. 465
Bigelovii, Gray 263, 466
Bolanderi, Gray 465
Breweri, Gray 266, 467
Californica, Benth. 466
campanulata, Gray 271, 470
capitata, Dougl. 469
ciliata, Benth. 264, 466
congesta, Hook. 268, 468
coronopifolia, Pers. 468
cotulæfolia, Steud. 467
demissa, Gray 465
densiflora, Benth. 466
densifolia, Benth. 468
dianthoides, Endl. 465
dichotoma, Benth. 466
divaricata, Torr. 467
filicaulis, Torr. 467
filifolia, Nutt. 267, 468
floccosa, Gray 267, 468
floribunda, Gray 466
Gunnisoni, T. & G. 268, 468
iberidifolia, Benth. 468
incisa, Benth. 470
inconspicua, Dougl. 270, 470
intertexta, Steud. 266, 467
leptomeria, Gray 270, 470
leucocephala, Gray 467
liniflora, Benth. 262, 465
micrantha, Steud. 264, 466
micromeria, Gray 271, 470
minima, Gray 266, 467
minutiflora, Benth. 469
multicaulis, Benth. 469
nudicaulis, Gray 264, 466
Nuttallii, Gray 264, 466
pinnatifida, Nutt. 469
polycladon, Torr. 268, 468
pumila, Nutt. 268, 468
pungens, Benth. 265, 467
pusilla, Benth. 263, 465
rigidula, Benth. 470
Schottii, S. Watson 267, 468
setosissima, Gray 267, 467
spicata, Nutt. 468
squarrosa, Hook. 467

Page.
Gilia stenothyrsa, Gray ........ 269, 469
subnuda, Torr. ........ 269, 469
tenella, Benth. ........ 466
tenerrima, Gray ........ 270, 469
tenuiflora, Benth. ........ 469
tricolor, Benth. ........ 469
virgata, Steud. ........ 468
viscidula, Gray ........ 467
Watsoni, Gray ........ 265, 466
Wrightii, Gray ........ 468
Glaux maritima, L. ........ 214
Glyceria aquatica, Sm. ........ 384
*aquatica*, Presl ........ 385
distans, Wahl. ........ 385
pauciflora, Presl ........ 384
*Glycosma occidentalis*, Nutt. ........ 122
Glycyrrhiza lepidota, Nutt. ........ 78
Glyptopleura, D. C. Eaton ........ 207
marginata, D. C. Eaton ........ 207
Gnaphalium luteo-album, L. ........ 184
palustre, Nutt. ........ 184, 422
*Sprengelii*, Hook. ........ 184
uliginosum, L. ........ 185
GNETACEÆ ........ 328
Gratiola Virginiana, L. ........ 227
Grayia, H. & A. ........ 292
polygaloides, H. & A. ........ 292
*spinosa*, Moq. ........ 292
Grimmia anodon, Br. & Sch. ........ 403
apocarpa, Br. & Sch. ........ 403
calyptrata, Hook. ........ 403
conferta, Funk. ........ 402
leucophæa, Grev. ........ 404
montana, Br. & Sch. ........ 404
ovata, Web. & Mohr ........ 403
orbicularis, Br. & Sch. ........ 403
pulvinata, Dill. ........ 403
Grindelia, Willd. ........ 163
squarrosa, Dunal ........ 163
Habenaria dilatata, Gray ........ 340
fœtida, S. Watson ........ 341
hyperborea, R. Br. ........ 340
HALORAGEÆ ........ 102
Halostachys, C. A. Mey. ........ 293
occidentalis, S. Watson ........ 293
Ritteriana, Moq. ........ 294
Hedysarum boreale, Nutt. ........ 78
Mackenzii, Rich. ........ 78, 419
Helenium autumnale, L. ........ 175
Hoopesii, Gray ........ 175
Helianthella multicaulis, D. C. Eaton ........ 170
uniflora, T. & G. ........ 170
Helianthus exilis, Gray ........ 168
giganteus, L. ........ 169
lenticularis, Dougl. ........ 169
Nuttallii, T. & G. ........ 169
uniflorus, Nutt. ........ 170
Heliomeris, Nutt. ........ 170
multiflora, Nutt. ........ 170
——— ? ........ 423
Heliotropium Curassavicum, L. ........ 248
*Helonias paniculata*, Nutt. ........ 343
*Hemiptilium*, Gray ........ 197
*Bigelovii*, Gray ........ 198
Hemizonia, DC. ........ 177
Durandi, Gray ........ 177
HEPATICÆ ........ 411
Heracleum lanatum, Mx. ........ 131, 421
Hermidium, S. Watson ........ 286, 475
alipes, S. Watson ........ 286
*Herpestis pilosus*, Benth. ........ 225
Hesperalœ, Eng. ........ 497
yuccæfolia, Eng. ........ 497
*Hesperis Menziesii*, Hook. ........ 14
Hesperocallis undulata, Gray ........ 488
Hesperochiron, S. Watson ........ 281
Californicus, S. Watson ........ 281
*Hesperoscordon hyacinthinum*, Lindl. ........ 354
*maritimum*, Torr. ........ 354, 488
Heterocodon, Nutt. ........ 209
rariflorum, Nutt. ........ 209
Heuchera cylindrica, Dougl. ........ 96
parvifolia, Nutt. ........ 96
rubescens, Torr. ........ 96
sanguinea, Eng. ........ 96
Hieracium albiflorum, Hook. ........ 200
Scouleri, Hook. ........ 199
triste, Willd. ........ 200
Hierochloa borealis, R. & S. ........ 393
Hippuris vulgaris, L. ........ 102
Hordeum Himalayense, Ritt. ........ 391
jubatum, L. ........ 390
pratense, Huds. ........ 391
Horkelia, Ch. & Sch. ........ 89, 447
Bolanderi, Gray ........ 448
Californica, Ch. & Sch. ........ 447
capitata, Lindl. ........ 447
congesta, Hook. ........ 448
fusca, Lindl. ........ 448
*Gordoni*, Hook. ........ 90
parviflora, Nutt. ........ 89, 447
tenuiloba, Gray ........ 448
Hosackia, Benth. ........ 432
angustifolia, G. Don ........ 434
argophylla, Gray ........ 62, 433
bicolor, Dougl. ........ 434
brachycarpa, Benth. ........ 435
crassifolia, Benth. ........ 434
cytisoides, Benth. ........ 433
decumbens, Benth. ........ 433
gracilis, Benth. ........ 434
grandiflora, Benth. ........ 434
Heermanni, Dur. & Hilg. ........ 63, 433
incana, Torr. ........ 434
juncea, Benth. ........ 433
lathyroides, Dur. & Hilg. ........ 434
maritima, Nutt. ........ 434
micrantha, Nutt. ........ 433
oblongifolia, Benth. ........ 434
parviflora, Benth. ........ 434

Page.
Hosackia prostrata, Nutt. 433
puberula, Benth. 419, 433
Purshiana, Benth. 63, 434
rigida, Benth. 433
scoparia, Nutt. 433
sericea, Benth. 433
stipularis, Benth. 434
strigosa, Nutt. 434
subpinnata, T. & G. 63, 435
tomentosa, H. & A. 433
Wrightii, Gray 419, 432, 433
Humulus Lupulus, L. 321
*Hutchinsia calycina*, Desv. 24
Hydnum ——? 414
Hydrophyllum capitatum, Dougl. 248
macrophyllum, Nutt. 248
HYDROPTERIDES 397
Hymenoclea, T. & G. 166
monogyra, T. & G. 166
*Hymenolobus divaricatus*, Nutt. 28
Hymenopappus luteus, Nutt. 424
tenuifolius, Pursh 173
HYPERICACEÆ 45
Hypericum mutilum, L. 46
Scouleri, Hook. 45
Hypnum aduncum, Hedw. 411
filicinum, L. 411
fluitans, L. 411
imponens, Hedw. 410
pallescens, Schp. 410
uncinatum, Hedw. 410
——? 411
*Iodanthus hesperidoides*, T. & G. 19, 25
*pinnatifida*, Gray 19, 25
IRIDACEÆ 342
Iris *longipetala*, Torr. 342
Tolmieana, Herb. 342
Isoetes echinospora, Durieu 397
Iva axillaris, Pursh 165
Ivesia, T. & G. 90, 448
Baileyi, S. Watson 90, 91, 449
Gordoni, T. & G. 90, 448
*gracilis*, Torr. 91
Kingii, S. Watson 91, 448
lycopodioides, Gray 90, 448
Pickeringii, Torr. 448
pygmæa, Gray 90, 448
santolinoides, Gray 448
tridentata, Gray 448
unguiculata, Gray 448
Jamesia, T. & G. 97
Americana, T. & G. 97
JUNCACEÆ 355
Juncus, L. 491
acuminatus, Mx. 494
acutus, L. 491
alpinus, Vill. 494
arcticus, Willd. 492
articulatus, L. 494
asper, Eng. 495

Page.
Juncus Balticus, Deth. 356, 491
biglumis, L. 492
Bolanderi, Eng. 494
brachycarpus, Eng. 494
Breweri, Eng. 491
bufonius, L. 357, 493
Canadensis, J. Gay 495
castaneus, Sm. 492
caudatus, Chapm. 495
chlorocephalus, Eng. 359, 495
compressus, HBK. 491
Cooperi, Eng. 491
dichotomus, Ell. 493
Drummondii, E. Mey. 356, 492
dubius, Eng. 494
effusus, L. 491
Elliottii, Chapm. 494
falcatus, E. Mey. 493
filiformis, L. 492
Gerardi, Lois. 493
Greenii, Oakes & Tuck. 493
Hallii, Eng. 492
Kelloggii, Eng. 493
leptocaulis, T. & G. 493
Lesueurii, Bol. 491
longistylis, T. & G. 357, 493
marginatus, Rostk. 493
Mertensianus, Bong. 358, 495
militaris, Big. 494
nodosus, L. 494
obtusatus, Eng. 493
oxymeris, Eng. 495
Parryi, Eng. 357, 492
patens, E. Mey. 491
pelocarpus, E. Mey. 494
phæocephalus, Eng. 495
procerus, E. Mey. 491
repens, Mx. 493
Rœmerianus, Scheele 491
scirpoides, Lam. 494
setaceus, Rostk. 492
Smithii, Eng. 492
stygius, L. 492
supiniformis, Eng. 494
tenuis, Willd. 493
trifidus, L. 492
triformis, Eng. 357, 493
triglumis, L. 492
Vaseyi, Eng. 492
xyphioides, E. Mey. 358, 495
Juniperus communis, L. 335
occidentalis, Hook. 336
Virginiana, L. 335
Kalmia glauca, Ait. 211, 425
Kochia, Roth. 293
prostrata, Schrad. 293
Kœleria cristata, Pers. 383
Krameria, L. 416
vifolia, Benth. 416
*Krynitzkia leiocarpa*, F. & M. 244

Page.

LABIATÆ ... 234
Lagophylla, Nutt. ... 178
ramosissima, Nutt. ... 178
Laphamia, Gray ... 164
Stansburii, Gray ... 164
Larrea, Cav. ... 417
Mexicana, Moric. ... 417
Lastarriæa, Remy ... 477
Chilensis, Remy ... 477
Lathyrus ornatus, Nutt. ... 79
palustris, L. ... 78, 419
polyphyllus, Nutt. ... 78
Layia, H. & A. ... 176
glandulosa, H. & A. ... 176, 422
heterotricha, H. & A. ... 177
Lecanora cervina, Nyl. ... 413
chlorophana, Ach. ... 413
cinerea, (L.) ... 413
muralis, Schær. ... 412
rubina, Schær. ... 412
subfusca, Ach. ... 412
xanthophana, Nyl. ... 413
Lecidea vesicularis, Ach. ... 413
Ledum glandulosum, Nutt. ... 211
LEGUMINOSÆ ... 53
Lemanea catenata, Kütz ... 415
Lemna minor, L. ... 336
polyrrhiza, L. ... 336
*Torreyi*, Aust. ... 336
trisulca, L. ... 336
Valdiviana, Philippi ... 336
LEMNACEÆ ... 336
LENTIBULACEÆ ... 214
Lenzites striata, Sw. ... 414
Lepidium alyssoides, Gray ... 29
dictyotum, Gray ... 30
flavum, Torr. ... 30
Fremontii, S. Watson ... 30
intermedium, Gray ... 29
montanum, Nutt. ... 29
nanum, S. Watson ... 30
ruderale, L. ... 29
——? ... 29
Leptobryum pyriforme, Dill. ... 404
*Leptotænia multifida*, Nutt. ... 127
Leucocoryne, Lindl. ... 489
Leucocrinum, Nutt. ... 349
montanum, Nutt. ... 349
Lewisia, Pursh ... 44
brachycalyx, Eng. ... 45
rediviva, Pursh ... 44
Libocedrus, Endl. ... 335
decurrens, Torr. ... 335
LICHENES ... 412
Ligusticum apiifolium, Benth. & Hook. ... 125
LILIACEÆ ... 343
Lilium Canadense, L. ... 346
parvum, Kell. ... 346
Limnobium palustre, L. ... 410
——? ... 410

Page.

Limosella aquatica, L. ... 227
LINACEÆ ... 49
Linnæa borealis, Gronov. ... 132
Linosyris, Lobel. ... 156
graveolens, T. & G. ... 156
Howardii, Parry ... 158
viscidiflora, T. & G. ... 157, 158
Linum Kingii, S. Watson ... 49
perenne, L. ... 49
Listera convallarioides, Hook. ... 341
Lithophragma, Nutt. ... 449
affinis, Gray ... 449
Bolanderi, Gray ... 449
Cymbalaria, T. & G. ... 449
glabra, Nutt. ... 449
heterophylla, Gray ... 449
parviflora, Nutt. ... 94, 449
tenella, Nutt. ... 95, 449
Lithospermum circumscissum, H. & A. ... 240
*decumbens*, Torr. ... 238
hirtum, Lehm. ... 238
incisum, Torr. ... 238
longiflorum, Spreng. ... 238
*multiflorum*, Torr. ... 238
*ruderale*, Dougl. ... 238
*Torreyi*, Nutt. ... 238
Lloydia, Salisb. ... 348
serotina, Reich. ... 348
LOASACEÆ ... 113
LOBELIACEÆ ... 208
Lonicera conjugialis, Kell. ... 133
involucrata, Banks ... 133
Utahensis, S. Watson ... 133
Lophanthus anisatus, Benth. ... 236
urticæfolius, Benth. ... 236
Lupinus Andersoni, S. Watson ... 58
argenteus, Pursh ... 55
aridus, Dougl. ... 57
brevicaulis, S. Watson ... 53
Breweri, Gray ... 58
cæspitosus, Nutt. ... 57
calcaratus, Kell. ... 56
decumbens, Torr. ... 56
flexuosus, Lindl. ... 55
laxiflorus, Dougl. ... 55
leucophyllus, Lindl. ... 57
leucopsis, Ag. ... 56
meionanthus, Gray ... 56
minimus, Dougl. ... 58
parviflorus, Nutt. ... 54
*plumosus*, Dougl. ... 57
polyphyllus, Lindl. ... 55
pusillus, Pursh ... 53
sericeus, Pursh ... 57
sulphureus, Dougl. ... 57
Torreyi, Gray ... 58
uncialis, S. Watson ... 54
——? ... 58
Luzula campestris, DC. ... 355
*comosa* E. Mey. ... 356

Page.

Luzula *melanocarpa*, Desv. .......... 455
parviflora, Desv. .......... 355
spadicea, DC. .......... 355
spicata, Desv. .......... 356
Lychnis, L. .......... 430
Ajanensis, Regel .......... 37, 431
apetala, L. .......... 36, 431
Drummondi, S. Watson .......... 37, 432
nuda, S. Watson .......... 37, 430
triflorum, R. Br. .......... 431
Lycium, L. .......... 472
Andersonii, Gray .......... 275, 473
barbinodum, Miers .......... 473
Berlandieri, Dunal .......... 473
brevipes, Benth. .......... 473
Carolinianum, Walt. .......... 473
Cooperi, Gray .......... 473
Fremonti, Gray .......... 473
macrodon, Gray .......... 473
pallidum, Miers .......... 275, 473
Palmeri, Gray .......... 473
parviflorum, Gray .......... 474
puberulum, Gray .......... 473
Richii, Gray .......... 473
Torreyi, Gray .......... 473
Lycoperdon gemmatum, Bull. .......... 414
giganteum, Batsch. .......... 414
LYCOPODIACEÆ .......... 397
Lycopus sinuatus, Ell. .......... 234
Lygodesmia juncea, Don .......... 200
spinosa, Nutt. .......... 200
Lysimachia ciliata, L. .......... 214
LYTHRACEÆ .......... 103
Machæranthera, Nees .......... 146
canescens, Gray .......... 146
*Macronema*, Nutt. .......... 158
*discoidea*, Nutt. .......... 159
*suffruticosa*, Nutt. .......... 159
Macrorrhynchus, Less. .......... 204
glaucus, D. C. Eaton .......... 204
grandiflorus, T. & G. .......... 206
heterophyllus, Nutt. .......... 206
troximoides, T. & G. .......... 205
Madaria, DC. .......... 178
elegans, DC. .......... 178
Madia, Mol. .......... 178
racemosa, T. & G. .......... 175
Malacothrix, DC. .......... 201
Californica, DC. .......... 201
Coulteri, Harv. & Gray .......... 201
obtusa, Benth. .......... 202
sonchoides, T. & G. .......... 201
*Malva hederacea*, Dougl. .......... 48
*Munroana*, Dougl. .......... 47
MALVACEÆ .......... 46
Malvastrum coccineum, Gray .......... 47
Fremontii, Torr. .......... 48
Munroanum, Gray .......... 47, 48
*pedatifidum*, Gray .......... 47
Mamillaria, Haw. .......... 115

Page.

Mamillaria, Grahami, Eng. .......... 115
Nuttallii, Eng. .......... 116
phellosperma, Eng. .......... 115
vivipara, Haw. .......... 115
Marchantia polymorpha, L. .......... 411
Marrubium vulgare, L. .......... 237
Marsilia vestita, Hook. & Grev. .......... 397
Maruta Cotula, DC. .......... 179
Matricaria discoidea, DC. .......... 179
Medicago sativa, L. .......... 58
Meesia uliginosa, L. .......... 407
Melandryum, Röh. .......... 430
Ajanense, Rohr. .......... 431
apetalum, Fenzl. .......... 36, 431
Baldwinii, Rohr. .......... 431
Bolanderi, Rohr. .......... 431
Californicum, Rohr. .......... 431
Greggii, Rohr. .......... 431
Hookeri, Rohr. .......... 431
Illinoense, Rohr. .......... 431
involucratum, Ch. & Sch. .......... 431
laciniatum, Rohr. .......... 431
Pennsylvanicum, Rohr. .......... 431
rotundifolium, Rohr. .......... 431
triflorum, Liebm. .......... 431
Virginicum, A. Br. .......... 431
Wrightii, Rohr. .......... 431
Melica poæoides, Nutt. .......... 383
stricta, Bol. .......... 384
Melilotus alba, Lam. .......... 58
parviflora, Desf. .......... 58
Mengea, Schauer .......... 296
Californica, Moq. .......... 296
Mentha Canadensis, L. .......... 234
Mentzelia albicaulis, Dougl. .......... 113, 114
congesta, Nutt. .......... 114
*gracilenta*, T. & G. .......... 114
lævicaulis, T. & G. .......... 114
micrantha, H. & A. .......... 114
multiflora, Nutt. .......... 421
ornata, T. & G. .......... 115
*Veatchiana*, Kell. .......... 114
Menyanthes trifoliata, L. .......... 281
Mertensia, Roth. .......... 461
alpina, Don .......... 240, 461
brevistyla, S. Watson .......... 239, 461
*Drummondii*, Don .......... 461
Fendleri, Gray .......... 461
maritima, Don .......... 461
oblongifolia, DC. .......... 238, 239, 461
paniculata, Don .......... 239, 461
Sibirica, Don .......... 239, 461
Virginica, DC. .......... 461
Merulius lachrymans, Schum. .......... 414
Milla, Cav. .......... 354, 489
biflora, Cav. .......... 490
capitata, Baker .......... 490
crocea, Baker .......... 490
grandiflora, Baker .......... 354, 490
hyacinthina, Baker .......... 354, 490

Page.
Milla ixioides, Baker 490
laxa, Baker 490
maritima, S. Watson 354, 490
peduncularis, Baker 490
MILLEÆ 448
*Miltitzia*, DC. 256
*lutea*, DC. 258
Mimulus cardinalis, Dougl. 223
floribundus, Dougl. 224
glabratus, HBK. 224
glutinosus, Thurb. 225
Jamesii, T. & G. 224
Lewisii, Pursh 223
luteus, L. 223, 224
*montioides*, Gray 225
moschatus, Dougl. 224
pilosus, S. Watson 225
primuloides, Benth. 224
propinquus, Lindl. 224
rubellus, Gray 225, 226
Mirabilis, L. 284, 474, 475
Californica, Gray 284, 475
Jalapa, L. 475
longiflora, L. 475
multiflora, Gray 475
oxybaphoides, Gray 475
triflora, Benth. 475
Mitella pentandra, Hook. 95
trifida, Grah. 95
Mnium affine, Bland. 407
medium, Br. & Sch. 407
Monardella, Benth. 235
odoratissima, Benth. 235
Moneses uniflora, Gray 212
Monolepis, Schrad. 288
chenopodioides, Moq. 288
pusilla, Torr. 289
spathulata, Gray 289
Muhlenbergia glomerata, Trin. 378
*monticola*, Buckl. 378
*pauciflora*, Buckl. 378
sylvatica, T. & G. 378
Mulgedium pulchellum, Nutt. 208, 422
MUSCI 398
Mycelium —— ? 414
*Myosotis tenella*, Nutt. 243
Myosurus aristatus, Benth. 5
minimus, L. 5
Myriophyllum verticillatum, L. 102
Myrrhis, Scop. 122
Bolanderi, Gray 123
occidentalis, Benth. & Hook. 122
NAIADACEÆ 337
Nama, L. 259, 460
Berlandieri, Gray 460
biflora, Chois. 460
Coulteri, Gray 460
demissa, Gray 259, 460
dichotoma, Ruiz. & Pav. 461
hirsuta, Mart. & Gal. 461

Page.
Nama hispida, Gray 259, 460
Jamaicensis, L. 460
latifolia, Gray 461
Lobbii, Gray 461
origanifolia, HBK. 461
rupicola, Bonpl. 461
Sandwicensis, Gray 460
sericea, Willd. 461
undulata, HBK. 460
Nasturtium lyratum, Nutt. 15
obtusum, Nutt. 15
officinale, R. Br. 15
palustre, DC. 15, 16
sinuatum, Nutt. 15
*Navarretia Schottii*, Torr. 267
Negundo aceroides, Mœnch. 52
Nemacaulis, Nutt. 476
Nuttallii, Benth. 476
Nemophila parviflora, Dougl. 249
*pedunculata*, Benth. 249
Nepeta Cataria, L. 236
Nicotiana attenuata, Torr. 276
Bigelovii, S. Watson 276
ipomopsiflora, Dunal 276
noctiflora, Hook. 276
plumbaginifolia, Dunal 276
Nitella, Ag. 398
opaca, Ag. 398
Nitrophila, S. Watson 297
occidentalis, S. Watson 297
Nostoc *alpinum*, Kütz 415
cristatum, Bailey 415
Dickæi, Sutherland 415
Nuphar advena, Ait. 13
NYCTAGINACEÆ 284, 474
Nyctaginia, Chois. 474
capitata, Chois. 474
NYMPHÆACEÆ 13
Obione, Gærtn. 289
acanthocarpa, Torr. 290
argentea, Moq. 290
canescens, Moq. 289
confertifolia, Torr. 289
hymenelytra, Torr. 290
microcarpa, Benth. 291
phyllostegia, Torr. 291
pusilla, Torr. 291
*spinosa*, Moq. 290
Torreyi, S. Watson 290
truncata, Torr. 291
ODONTOSTEMONEÆ 489
Odontostemum Hartwegi, Torr. 489
Œnothera albicaulis, Nutt. 106
alyssoides, H. & A. 111
Andina, Nutt. 112
biennis, L. 106
Boothii, Dougl. 110
breviflora, T. & G. 109
*brevipes*, Gray 109
*cæspitosa*, Nutt. 108

Page.
Œnothera *cardiophylla*, Torr. .......... 109
*chamænerioides*, Gray .......... 112
*clavæformis*, Torr. .......... 109
*contorta*, Hook. .......... 112
coronopifolia, T. & G. .......... 106
deltoides, Torr. .......... 107
densiflora, Lindl. .......... 109
dentata, Cav. .......... 111
*epilobioides*, Nutt. .......... 112
*eximia*, Gray .......... 108
glabella, Nutt. .......... 108
heterantha, Nutt. .......... 110
marginata, Nutt. .......... 108
micrantha, Hornem. .......... 111
*montana*, Nutt. .......... 108
Nuttallii, T. & G. .......... 110
*parvula*, Nutt. .......... 112
pterosperma, S. Watson .......... 112
scapoidea, Nutt. .......... 109
*strigulosa*, T. & G. .......... 112
tanacetifolia, T. & G. .......... 110
triloba, Nutt. .......... 107
viminea, Dougl. .......... 108
Oleaceæ .......... 283
Onagraceæ .......... 103
*Onychium densum*, Brackr. .......... 396
Opuntia, Tourn. .......... 118
acanthocarpa, Eng. & Big. .......... 120
arborescens, Eng. .......... 120
basilaris, Eng. & Big. .......... 118
erinacea, Eng. & Big. .......... 119
fragilis, Nutt. .......... 119
frutescens, Eng. .......... 120
hystricina, Eng. & Big. .......... 119
Missouriensis, DC. .......... 118
pulchella, Eng. .......... 119
rutila, Nutt. .......... 119
sphærocarpa, Eng. & Big. .......... 118
Orchidaceæ .......... 340
*Oreophila myrtifolia*, Nutt. .......... 50
Orobanchaceæ .......... 215
*Orobanche multiflora*, Nutt. .......... 215
Orogenia, S. Watson .......... 120
linearifolia, S. Watson .......... 120
Orthocarpus, Nutt. .......... 230, 457
attenuatus, Gray .......... 458
australis, Benth. .......... 459
bracteosus, Benth. .......... 458
campestris, Benth. .......... 457
castilleioides, Benth. .......... 459
densiflorus, Benth. .......... 458
erianthus, Benth. .......... 457
faucibarbatus, Gray .......... 457
floribundus, Benth. .......... 457
gracilis, Benth. .......... 457
hispidus, Benth. .......... 230, 458
imbricatus, Torr. .......... 458
lacerus, Benth. .......... 457
linearilobus, Benth. .......... 459
lithospermoides, Benth. .......... 457

Page.
Orthocarpus luteus, Nutt. .......... 231, 458
pallescens, Gray .......... 459
pilosus, S. Watson .......... 231, 459
purpurascens, Benth. .......... 458
purpureo-albus, Gray .......... 458
pusillus, Benth. .......... 457
tenuifolius, Benth. .......... 458
Tolmiei, H. & A. .......... 230, 458
Orthotrichum anomalum, Hedw. .......... 402
Jamesianum, Sull. .......... 401
lævigatum, Zett. .......... 402
*leiocarpum*, .......... 402
obtusifolium, .......... 401
occidentale, James .......... 402
rupestre, Schl. .......... 402
strangulatum, .......... 402
striatum, L. .......... 402
Sturmii, H. & H. .......... 401
Texanum, Sull. .......... 401
Watsoni, James .......... 401
Oryctes, S. Watson .......... 274
Nevadensis, S. Watson .......... 274
Osmorhiza brevistylis, DC. .......... 122
nuda, Torr. .......... 122
*Ourisia Californica*, Benth. .......... 281
Oxybaphus, L'Her. .......... 474, 475
aggregatus, Vahl .......... 475
albidus, Sweet .......... 475
angustifolius, Sweet .......... 284, 475
coccineus, Torr. .......... 475
Frœbelii, Behr. .......... 475
glabrifolius, Vahl .......... 475
hirsutus, Sweet .......... 475
nyctagineus, Sweet .......... 475
viscosus, L'Her. .......... 475
Oxyria digyna, Campd. .......... 313
Oxytheca, Nutt. .......... 310, 476
dendroidea, Nutt. .......... 310
*foliosa*, Nutt. .......... 311
perfoliata, T. & G. .......... 311
Watsoni, T. & G. .......... 311
Oxytropis, DC. .......... 446
campestris, L. .......... 77, 447
deflexa, DC. .......... 447
Lamberti, Pursh .......... 447
multiceps, Nutt. .......... 446
nana, Nutt. .......... 447
podocarpa, Gray .......... 447
splendens, Dougl. .......... 447
Uralensis. L. .......... 447
*viscida*, Nutt. .......... 77
*Pachypodium integrifolium*, Nutt. .......... 25
*laciniatum*, Nutt. .......... 25
*sagittatum*, Nutt. .......... 25
Pachystima, Raf. .......... 50
Myrsinites, Raf. .......... 50
Palafoxia, Lag. .......... 424
linearis, Lag. .......... 424
Panicum capillare, L. .......... 394
Crus-galli, L. .......... 394

Page.
Panicum dichotomum, L. .................. 394
Pannaria Hypnorum, Delis. ................ 412
PAPAVERACEÆ .............................. 13
Parietaria Pennsylvanica, Muhl. ........... 321
Parmelia conspersa, Ach. .................. 412
olivacea, Ach. .................. 412
Parnassia fimbriata, Banks ................ 97
parviflora, DC. ..................97, 420
Paronychia pulvinata, Gray ................ 298
PARONYCHIEÆ .............................. 298
Parrya, R. Br. ............................ 14
macrocarpa, R. Br. ................. 14
*Pastinaca sativa*, L. ..................... 128
Pedicularis bracteosa, Benth. ............. 233
Grœnlandica, Retz. ............ 233
racemosa, Dougl. .............. 234
Pellæa Breweri, D. C. Eaton ............... 395
densa, Hook. ...................... 396
Peltigera aphthosa, Hoffm. ................ 412
canina, Hoffm. .................. 412
rufescens, Hoffm. ............... 412
Pentachrophys, Gray ....................... 474
Wrightii, Gray ............... 474
Pentstemon, L'Her. ........................ 451
acuminatus, Dougl. ..........218, 452
albidus, Nutt. ................ 454
ambiguus, Torr. ............... 453
antirrhinoides, Benth. ........ 451
attenuatus, Lindl. ............ 454
azureus, Benth. ............... 455
baccharifolius, Hook. ......... 452
barbatus, Nutt. ............... 452
breviflorus, Benth. ..........217, 451
Bridgesii, Gray ............... 455
cæruleus, Nutt. .............218, 452
cæspitosus, Nutt. ...........219, 453
canoso-barbatus, Kell. ........ 455
carinatus, Kell. .............. 455
centranthifolius, Benth. ....219, 453
Cobæa, Nutt. .................. 454
confertus, Dougl. ...........221, 455
cordifolius, Benth. ........... 452
corymbosus, Benth. ............ 452
cristatus, Nutt. ............219, 454
cyananthus, Hook. ...........217, 452
dasyphyllus, Gray ............. 453
deustus, Dougl. .............221, 455
diffusus, Dougl. .............. 455
digitalis, Nutt. .............. 454
dissectus, Ell. ............... 453
Frémonti, T. & G. ...........218, 452
Gairdneri, Hook. .............. 453
glaber, Pursh ...............217, 452
glandulosus, Lindl. ........... 455
glaucus, Grah. ..............221, 454
gracilentus, Gray ...........222, 455
grandiflorus, Nutt. ........... 452
Hallii, Gray .................. 454
Harbouri, Gray ................ 454
heterander, T. & G. ........... 455
Pentstemon heterophyllus, Lindl. ..........222, 455
humilis, Nutt. ..............220, 454
Jamesii, Benth. ............... 454
Kingii, S. Watson ...........222, 455
lætus, Gray ................... 455
laricifolius, H. & A. ......... 453
linarioides, Gray ............. 453
Menziesii, Hook. ............216, 451
microphyllus, Gray ............ 451
Murrayanus, Hook. ............. 452
ovatus, Dougl. ................ 454
Palmeri, Gray ...............220, 454
pruinosus, Dougl. ...........221, 454
pubescens, Soland. ............ 454
pumilus, Nutt. ................ 453
puniceus, Gray ................ 453
Richardsonii, Dougl. .......... 455
rostriflorus, Kell. ........... 455
secundiflorus, Benth. ......... 452
*speciosus*, Dougl. ............ 217
spectabilis, Thurb. ........... 453
stenophyllus, Gray ............ 453
strictus, Benth. .............. 452
tenellus, Kell. ............... 455
ternatus, Torr. ............... 452
triphyllus, Dougl. ............ 455
tubiflorus, Nutt. ............. 454
venustus, Dougl. .............. 455
virgatus, Gray ................ 453
Whippleanus, Gray ............. 455
Wrightii, Hook. ............... 453
Petalonyx, Gray ........................... 421
Thurberi, Gray ................. 421
Peucedanum, L. ............................ 128
caruifolium, T. & G. .......... 130
dasycarpum, T. & G. ........... 131
fœniculaceum, Nutt. ........... 129
graveolens, S. Watson .......128, 129
*latifolium*, Nutt. ............ 128
macrocarpum, Nutt. ............ 130
millefolium, S. Watson ........ 129
nudicaule, Nutt. .............. 130
Nuttallii, S. Watson .......... 128
sativum, Benth. & Hook. ....... 128
simplex, Nutt. ................ 129
*tomentosum*, Benth. ........... 131
triternatum, Nutt. ............ 128
villosum, Nutt. ............... 131
Peziza stercorea, Pers. ................... 414
Phaca australis, L. ....................... 446
debilis, Nutt. ....................... 446
parvifolia, Nutt. ................... 446
Phacelia *aretioides*, Torr. ................ 256
bicolor, Torr. ................... 255
circinata, Jacq. ................. 250
crassifolia, Torr. ............... 255
crenulata, Torr. ................. 251
curvipes, Torr. .................. 252
Frémontii, Torr. ................. 253
gymnoclada, Torr. ...............255, 257

| | Page. |
|---|---|
| Phacelia humilis, T. & G. | 250 |
| integrifolia, Torr. | 250 |
| Ivesiana, Torr. | 254 |
| Menziesii, Torr. | 252 |
| Palmeri, Torr. | 251 |
| pusilla, Torr. | 253 |
| rotundifolia, Torr. | 253 |
| sericea, Gray | 252 |
| tanacetifolia, Benth. | 251 |
| Phalaris arundinacea, L. | 393 |
| intermedia, Bosc. | 393 |
| Phelipæa comosa, T. & G. | 215 |
| erianthera, Eng. | 215 |
| Ludoviciana, Walp. | 215 |
| Philonotis calcarea, Br. & Sch. | 407 |
| fontana, L. | 407 |
| Phleum alpinum, L. | 375 |
| pratense, L. | 375 |
| Phlox, L. | 462 |
| adsurgens, Torr. | 464 |
| amœna, Sims | 462 |
| bifida, Beck | 463 |
| bryoides, Nutt. | 463 |
| cæspitosa, Nutt. | 259, 463 |
| canescens, T. & G. | 259, 463 |
| divaricata, L. | 462 |
| Douglasii, Hook. | 260, 463 |
| Drummondii, Hook. | 464 |
| Floridana, L. | 462 |
| glaberrima, L. | 462 |
| Hoodii, Rich. | 463 |
| linearifolia, Gray | 464 |
| longifolia, Nutt. | 260, 464 |
| maculata, L. | 462 |
| muscoides, Nutt. | 463 |
| nana, Nutt. | 464 |
| ovata, L. | 462 |
| paniculata, L. | 462 |
| pilosa, L. | 462 |
| reptans, Mx. | 463 |
| Richardsonii, Hook. | 463 |
| Rœmeriana, Scheele | 464 |
| Sibirica, L. | 463 |
| speciosa, Pursh | 464 |
| Stellaria, Gray | 463 |
| subulata, L. | 463 |
| *Phœnicaulis cheiranthoides*, Nutt. | 14 |
| Phragmites communis, Trin. | 390 |
| Physalis pubescens, Willd. | 274 |
| Physaria, Nutt. | 20 |
| didymocarpa, Gray | 20 |
| Physcia obscura, Nyl. | 412 |
| stellaris, (L.) | 412 |
| Physcomitrium pygmæum, James | 404 |
| pyriforme, | 404 |
| *Picrothamnus desertorum*, Nutt. | 180 |
| Pimpinella, L. | 121 |
| apiodora, Gray | 121 |
| Pinus *amabilis*, Dougl. | 333 |
| *aristata*, Eng. | 332 |
| Pinus Balfouriana, Murr. | 331 |
| *Bolanderi*, Parl. | 330 |
| *commutata*, Parl. | 332 |
| contorta, Dougl. | 330 |
| *Douglasii*, Sabin | 334 |
| edulis, Eng. | 330 |
| flexilis, James | 332 |
| *grandis*, Dougl. | 334 |
| *Menziesii*, Dougl. | 333 |
| monophylla, Torr. | 330 |
| ponderosa, Dougl. | 331 |
| Piptocalyx, Torr. | 240 |
| circumscissus, Torr. | 240 |
| Pisonia, L. | 475 |
| aculeata, L. | 475 |
| obtusata, Sw. | 475 |
| Placodium cerinum, Næg. & Hepp. | 412 |
| elegans, Link | 412 |
| fulgens, DC. | 412 |
| vitellinum, Næg. & Hepp. | 412 |
| *Plagiobotrys canescens*, Benth. | 244 |
| PLANTAGINACEÆ | 212 |
| Plantago Bigelovii, Gray | 212 |
| eriopoda, Torr. | 212 |
| Patagonica, Jacq. | 213 |
| pusilla, Nutt. | 213 |
| *Platanthera fœtida*, Gey. | 341 |
| Platyspermum, Hook. | 20 |
| scapigerum, Hook. | 20 |
| Plectritis, Lindl. | 136 |
| congesta, DC. | 136, 422 |
| Pleuraphis, Torr. | 381 |
| Jamesii, Torr. | 381 |
| Poa alpina, L. | 386 |
| Andina, Nutt. | 388 |
| annua, L. | 385 |
| *arctica*, R. Br. | 386 |
| cæsia, Sm. | 386 |
| Eatoni, S. Watson | 386 |
| flexuosa, Muhl. | 386 |
| *Hallii*, Godet | 386 |
| Kingii, S. Watson | 387 |
| laxa, Hænke | 386 |
| nemoralis, L. | 386 |
| serotina, Ehrh. | 386 |
| tenuifolia, Nutt. | 387 |
| Pæonia, L. | 12 |
| Brownii, Dougl. | 12 |
| Polanisia *trachysperma*, T. & G. | 34 |
| uniglandulosa, DC. | 34 |
| POLEMONIACEÆ | 259, 462 |
| Polemonium, Tourn. | 462, 470 |
| cæruleum, L. | 272, 470 |
| confertum, Gray | 271, 470 |
| humile, Willd. | 470 |
| micranthum, Benth. | 272, 470 |
| reptans, L. | 470 |
| viscosum, Nutt. | 470 |
| procumbens, Clairv. | 89 |
| pulcherrima, Lehm. | 87 |

| | Page. |
|---|---|
| *Polyantherix Hystrix*, Nees | 391 |
| POLYGALACEÆ | 416 |
| POLYGONACEÆ | 298 |
| Polygonatum giganteum, Dietr. | 346 |
| Polygonum amphibium, L. | 316 |
| aviculare, L. | 315 |
| Bistorta, L. | 317 |
| coarctatum, Dougl. | 316 |
| *confertifolium*, Nutt. | 316 |
| Convolvulus, L. | 317 |
| *imbricatum*, Nutt. | 316 |
| lapathifolium, Ait. | 317 |
| minimum, S. Watson | 315 |
| Persicaria, L. | 316 |
| polymorphum, Ledeb. | 317 |
| *ramosissimum*, Mx. | 315 |
| tenue, Mx. | 315 |
| viviparum, L. | 317 |
| Polypodium vulgare, L. | 395 |
| Polypogon Monspeliensis, Desf. | 378 |
| Polytrichadelphus Lyallii, Mitt. | 408 |
| Polytrichum juniperinum, Dill. | 408 |
| piliferum, L. | 408 |
| PONTEDERIACEÆ | 359 |
| Populus *angustifolia*, James | 327 |
| balsamifera, L. | 327 |
| *Canadensis*, Desf. | 327 |
| *candicans*, Ait. | 327 |
| monilifera, Ait. | 327 |
| tremuloides, Mx. | 327 |
| trichocarpa, Torr. | 328 |
| Portulaca oleracea, L. | 42 |
| PORTULACACEÆ | 42 |
| Potamogeton cæspitosus, Nolte | 338 |
| *filiformis*, Nolte | 339 |
| gramineus, L. | 337 |
| lonchites, Tuck. | 337 |
| marinus, L. | 339 |
| natans, L. | 337 |
| pectinatus, L. | 338 |
| perfoliatus, L. | 337 |
| pusillus, L. | 338 |
| rufescens, Schrad. | 337 |
| zosteraceus, Fries | 338 |
| Potentilla Anserina, L. | 89 |
| arguta, Pursh | 89 |
| diversifolia, Lehm. | 86, 87 |
| fastigiata, Nutt. | 88 |
| fruticosa, L. | 89 |
| glandulosa, L. | 89 |
| gracilis, Dougl. | 88 |
| millegrana, Eng. | 85 |
| Newberryi, Gray | 91 |
| nivea, L. | 87 |
| Norvegica, L. | 85 |
| Nuttallii, Lehm. | 88 |
| Pennsylvanica, L. | 86, 87 |
| Plattensis, Nutt. | 87 |
| *rigida*, Nutt. | 88 |
| Soongarica, Bunge | 87 |
| Pottia cavifolia, Ehrh. | 398 |
| Heimii, Hook. | 399 |
| subsessilis, Schwg. | 398 |
| truncata, Br. & Sch. | 398 |
| Primula Parryi, Gray | 213 |
| PRIMULACEÆ | 213 |
| *Prionopsis*, Nutt. | 158 |
| Prosartes Hookeri, Torr. | 344 |
| trachyandra, Torr. | 345 |
| trachycarpa, S. Watson | 344 |
| Prosopis, L. | 420 |
| cinerascens, H. & A. | 420 |
| glandulosa, Torr. | 420 |
| pubescens, Benth. | 420 |
| Protococcus nivalis, Ag. | 415 |
| Prunus Andersonii, Gray | 79 |
| demissa, Walp. | 80 |
| emarginata, Walp. | 79 |
| minutiflora, Eng. | 420 |
| Virginiana, L. | 80 |
| Psathyrotes, Gray | 192 |
| annua, Gray | 192 |
| Pseudoleskea catenulata, Schl. | 408 |
| Psoralea lanceolata, Pursh | 63 |
| Ptelea angustifolia, Benth. | 50 |
| Pteris aquilina, L. | 395 |
| Pterospora Andromedea, Nutt. | 212 |
| Pterostegia, F. & M. | 477 |
| drymarioides, F. & M. | 477 |
| macroptera, Benth. | 477 |
| *Ptilophora nutans*, Gray | 196 |
| Puccinia brunnea, J. S. Billings | 414 |
| Gayophyti, J. S. Billings | 414 |
| rugosa, J. S. Billings | 414 |
| Purshia, DC. | 82 |
| tridentata, DC. | 82 |
| Pyrola chlorantha, Swartz | 211 |
| rotundifolia, L. | 211 |
| secunda, L. | 211 |
| *Pyrrocoma*, Hook. | 158 |
| *paniculata*, T. & G. | 162 |
| Pyrus sambucifolia, Ch. & Sch. | 92 |
| Quercus alba, L. | 321 |
| Douglasii, Hook. | 322 |
| *obtusiloba*, Mx. | 321 |
| stellata, Wang. | 321 |
| Radula complanata, Dumort. | 411 |
| RANUNCULACEÆ | 3 |
| Ranunculus adoneus, *(amœnus,)* Gray | 9 |
| affinis, R. Br. | 7 |
| alismæfolius, Gey. | 7 |
| Andersonii, Gray | 6 |
| aquatilis, L. | 5 |
| auricomus, L. | 7 |
| Cymbalaria, Pursh | 7 |
| digitatus, Hook. | 8 |
| divaricatus, Schrank | 6 |
| *divaricatus*, Gray | 6 |
| *Eschscholtzii*, Schl. | 8 |
| fascicularis, Muhl. | 9 |

Ranunculus Flammula, L. 7
glaberrimus, Hook. 8
*limosus*, Nutt. 8
macranthus, Scheele 9
multifidus, Pursh 8
nivalis, R. Br. 8
orthorhynchus, Hook. 9
repens, L. 9
sceleratus, L. 8
RHAMNEÆ 51
Rhus aromatica, Ait. 53
glabra, L. 52, 419
Toxicodendron, L. 53
*trilobata*, Nutt. 53
Ribes aureum, Pursh 100
bracteosum, Dougl. 99
cereum, Dougl. 99
*glutinosum*, Benth. 100
hirtellum, Mx. 97
irriguum, Dougl. 98
lacustre, Poir. 98, 99
leptanthum, Gray 98
malvaceum, Sm. 100
prostratum, L'Her. 99
sanguineum, Pursh 100
*setosum*, Dougl. 99
viscosissimum, Pursh 100
Riccia crystallina, L. 411
glauca, L. 411
Rigiopappus, Gray 176
leptocladus, Gray 176
Rinodia sophodes, (Ach., Nyl.) 413
Robinia Neo-Mexicana, Gray 419
Rosa blanda, Ait. 91
fraxinifolia, Bork. 92
RUBIACEÆ 134
Rubus leucodermis, Dougl. 82
Nutkanus, Moç. 81
strigosus, Mx. 82, 420
Rudbeckia occidentalis, Nutt. 168
Rumex aquaticus, L. 314
Britannica, L. 314
*Engelmanni*, Ledeb. 314
hastatulus, Bald. 314
*hastulatus*, Sm. 315
longifolius, DC. 314
maritimus, L. 314
paucifolius, Nutt. 314
salicifolius, Weinm. 314
venosus, Pursh 313
RUTACEÆ 50
Sagina Linnæi, Presl 41
nivalis, Fries 42
Sagittaria variabilis, Eng. 340
Salazaria, Torr. 237
Mexicana, Torr. 237
SALICACEÆ 324
Salicornia fruticosa, L. 294
herbacea, L. 293
Salix artica, R. Br. 326
Salix cordata, Muhl. 324
glauca, L. 325
Hindsiana, Benth. 324
longifolia, Muhl. 324
phlebophylla, And. 326
reticulata, L. 327
*Salsola depressa*, Pursh 294
*linearis*, Ell. 295
Salvia Columbariæ, Benth. 235
Sambucus Canadensis, L. 134
glauca, Nutt. 134
*pubens* Mx. 133
racemosa, L. 133
Samolus Valerandi, L. 214
SANTALACEÆ 319
SAPINDACEÆ 52
Saponaria Vaccaria, L. 36
Sarcobatus, Nees 295
vermiculatus, Torr. 295
Satureia hortensis, L. 235
SAURURACEÆ 426
Saxifraga adscendens, L. 93
*æstivalis*, Fisch. 94
cæspitosa, L. 93, 420
*controversa*, Sternb. 93
flagellaris, Willd. 94
integrifolia, Hook. 93
nivalis, L. 93
punctata, L. 94
rivularis, L. 93
*Virginiensis*, Mx. 93
SAXIFRAGEÆ 93
Schoberia, C. A. Mey. 295
occidentalis, S. Watson 295
Schollera graminea, Willd. 359
Scirpus maritimus, L. 360
microcarpus, Presl 360
Nevadensis, S. Watson 360
Torreyi, Olney 360
validus, Vahl 360
Sclerochloa Californica, Munro 388
Scrophularia nodosa, L. 216
SCROPHULARIACEÆ 215
Scutellaria *Drummondii*, Benth. 237
galericulata, L. 237
resinosa, Torr. 237
Sedum debile, S. Watson 102
rhodanthum, Gray 101
Rhodiola, DC. 101
stenopetalum, Pursh 101
*Torreyi*, Don 102
Selaginella rupestris, Spring 397
Selinocarpus, Gray 474
angustifolius, Gray 474
chenopodioides, Gray 474
diffusus, Gray 474
Selinum, L. 126
capitellatum, Benth. & Hook. 126
Kingii, S. Watson 126
Senecio amplectens, Gray 192

Page.

Senecio Andinus, Nutt. ..... 189
aureus, L. ..... 189
canus, Hook. ..... 190
eremophilus, Rich. ..... 191
*exaltatus*, Nutt. ..... 188
Fendleri, Gray ..... 190, 422
filifolius, Nutt. ..... 191
Frémontii, T. & G. ..... 192
hydrophilus, Nutt. ..... 189
multilobatus, T. & G. ..... 191
lugens, Rich. ..... 188
Serra, Hook. ..... 189
triangularis, Hook. ..... 189
Sesuvium Portulacastrum, L. ..... 120
Setaria viridis, Beauv. ..... 394
*Seubertia*, Kth. ..... 490
*crocea*, Wood ..... 490
Shepherdia argentea, Nutt. ..... 318
Canadensis, Nutt. ..... 318
*Sibbaldia procumbens*, L. ..... 89
Sida hederacea, Torr. ..... 48
*malvæflora*, DC. ..... 46
Sidalcea, Gray ..... 46
candida, Gray ..... 46
malvæflora, Gray ..... 46
Silene, L. ..... 430
acaulis, L. ..... 36, 432
antirrhina, L. ..... 36, 432
Baldwinii, Nutt. ..... 431
Bolanderi, Gray ..... 431
Bridgesii, Rohr. ..... 432
Californica, Dur. ..... 431
Douglasii, Hook. ..... 36, 431
*Drummondii*, Hook. ..... 37, 432
*Engelmanni*, Rohr. ..... 432
Greggii, Gray ..... 431
Hookeri, Nutt. ..... 431
incompta, Gray ..... 432
laciniata, Cav. ..... 431
Menziesii, Hook. ..... 36, 432
nivea, DC. ..... 431
ovata, Pursh ..... 432
Pennsylvanica, Mx. ..... 431
regia, Sims ..... 431
rotundifolia, Nutt. ..... 431
Scouleri, Hook. ..... 432
stellata, Ait. ..... 432
Wrightii, Gray ..... 431
SILENEÆ ..... 430
Simsia, Pers. ..... 423
canescens, Gray ..... 423
*Sinapis*, L. ..... 28
*Sitanion elymoides*, Raf. ..... 391
Sisymbrium Californicum, S. Watson ..... 23
canescens, Nutt. ..... 23
junceum, Bieb. ..... 23
*reflexum*, Kell. ..... 18
Sisyrinchium Bermudiana, L. ..... 342
grandiflorum, Dougl. ..... 342
Sium angustifolium, L. ..... 121

Page.

Sium lineare, Mx. ..... 121
Smelowskia, Meyer ..... 24
*Californica*, Gray ..... 23
calycina, Mey. ..... 24
Smilacina *amplexicaulis*, Nutt. ..... 345
racemosa, Desf. ..... 345
stellata, Desf. ..... 345
SOLANACEÆ ..... 274
Solanum nigrum, L. ..... 274
umbelliferum, Esch. ..... 274
Solidago elongata, Nutt. ..... 155
gigantea, Ait. ..... 156
Guiradonis, Gray ..... 154
lanceolata, L. ..... 156
nana, Nutt. ..... 155
nemoralis, Ait. ..... 155
occidentalis, T. & G. ..... 156
pumila, T. & G. ..... 155
Radula, Nutt. ..... 155
speciosa, Nutt. ..... 155
stricta, Ait. ..... 154
Virga-aurea, L. ..... 154
Sonchus asper, Vill. ..... 208
Sparganium eurycarpum, Eng. ..... 337
minimum, Bauh. ..... 337
Spartina gracilis, Trin. ..... 381
Specularia perfoliata, DC. ..... 209
Spergularia media, Presl ..... 42
*Sphænosciadium capitellatum*, Gray ..... 126
Sphæralcea, St. Hill. ..... 48
acerifolia, Nutt. ..... 48
angustifolia, Spach. ..... 48, 417
Emoryi, Torr. ..... 48
Fendleri, Gray ..... 48, 417
incana, Torr. ..... 47, 48, 417
Lindheimeri, Gray ..... 48
*Wrightii*, Gray ..... 48
Spiræa ariæfolia, Sm. ..... 81
cæspitosa, Nutt. ..... 81
dumosa, Nutt. ..... 80
opulifolia, L. ..... 80
Spiranthes Romanzoffiana, Cham. ..... 341
*Sporobolus airoides*, Torr. ..... 375
*asperifolius*, Thurb. ..... 375
*cryptandrus*, Gray ..... 375
*ramulosus*, Kth. ..... 376
Spraguea, Torr. ..... 44
paniculata, Kell. ..... 44
umbellata, Torr. ..... 44
Stachys palustris, L. ..... 237
Stanleya, Nutt. ..... 24
*fruticosa*, Nutt. ..... 24
*heterophylla*, Nutt. ..... 24
*integrifolia*, James ..... 24
pinnatifida, Nutt. ..... 24
viridiflora, Nutt. ..... 25
Stellaria borealis, Big. ..... 38, 39
crassifolia, Ehrh. ..... 38, 417
*gracilis*, Rich. ..... 39
Jamesii, Torr. ..... 38

| | Page. |
|---|---|
| Stellaria Kingii, S. Watson | 39 |
| longipes, Goldie | 38 |
| umbellata, Turcz. | 38 |
| *Stegnocarpus*, Torr. | 247 |
| *canescens*, Torr. | 247 |
| *Stenotus*, Nutt. | 158 |
| *acaulis*, Nutt. | 161 |
| cæspitosus, Nutt. | 161 |
| Stephanomeria, Nutt. | 197 |
| exigua, Nutt. | 198 |
| minor, Nutt. | 197 |
| myrioclada, D. C. Eaton | 198 |
| paniculata, Nutt. | 198 |
| pentachæta, D. C. Eaton | 199, 422 |
| *runcinata*, Nutt. | 197 |
| Stipa ciliata, Scheele | 380 |
| comata, Trin. | 380 |
| leucotricha, Trin. | 380 |
| Mongolica, Turcz. | 381 |
| Neesiana, Trin. | 380 |
| occidentalis, Thurb. | 380 |
| pennata, L. | 381 |
| setigera, Presl | 380 |
| spartea, Trin. | 379 |
| viridula, Trin. | 380 |
| Streptanthus, Nutt. | 19, 429 |
| *angustifolius*, Nutt. | 18 |
| *arcuatus*, Nutt. | 18 |
| bracteatus, Gray | 429 |
| Breweri, Gray | 429 |
| carinatus, Wright | 429 |
| cordatus, Nutt. | 19, 416, 429 |
| *Coulteri*, Gray | 27 |
| *crassicaulis*, Torr. | 27 |
| flavescens, Hook. | 25, 430 |
| *flavescens*, Torr. | 25 |
| glandulosus, Hook. | 430 |
| heterophyllus, Nutt. | 25, 430 |
| *heterophyllus*, Gray | 27 |
| hispidus, Gray | 430 |
| hyacinthoides, Hook. | 429 |
| *linearifolius*, Gray | 25 |
| *longifolius*, Benth. | 25 |
| maculatus, Nutt. | 429 |
| micranthus, Gray | 25 |
| platycarpus, Gray | 429 |
| polygaloides, Gray | 430 |
| *procerus*, Brew. | 27 |
| repandus, Nutt. | 430 |
| sagittatus, Nutt. | 26 |
| tortuosus, Kell. | 429 |
| *virgatus*, Nutt. | 18 |
| Streptopus amplexifolius, DC. | 345 |
| *Strombocarpa*, Benth. | 420 |
| *pubescens*, Gray | 420 |
| *Stropholirion*, Torr. | 353 |
| *Californicum*, Torr. | 489 |
| Suæda depressa, Ledeb. | 294 |
| fruticosa, Forsk. | 294 |
| maritima, Dumort. | 294 |
| Suæda *Moquini*, Torr. | 295 |
| prostrata, Pall. | 294 |
| Swertia, L. | 280 |
| perennis, L. | 280 |
| Symphoricarpus *glaucescens*, Hook. | 133 |
| microphyllus, HBK. | 133 |
| montanus, HBK. | 132 |
| *rotundifolius*, Gray | 133 |
| Synthyris pinnatifida, S. Watson | 227 |
| Talinum pygmæum, Gray | 42 |
| Tanacetum canum, D. C. Eaton | 179 |
| diversifolium, D. C. Eaton | 180 |
| Taraxacum Dens-leonis, Desf. | 206 |
| palustre, DC. | 206 |
| phymatocarpum, Vahl | 207 |
| Tayloria splachnoides, Schl. | 404 |
| Tellima, R. Br. | 97, 449 |
| grandiflora, Dougl. | 449 |
| parviflora, Hook. | 94, 449 |
| tenella, Benth. & Hook. | 95, 449 |
| Tessaria, Ruiz & Pav. | 422 |
| borealis, T. & G. | 422 |
| *Tesseranthium radiatum*, Kell. | 280 |
| Tetradymia, DC. | 193 |
| canescens, DC. | 193 |
| glabrata, T. & G. | 193 |
| *inermis*, Nutt. | 193 |
| Nuttallii, T. & G. | 194 |
| spinosa, H. & A. | 194, 422 |
| Thalictrum alpinum, L. | 4 |
| *clavatum*, Hook. | 4 |
| Fendleri, Eng. | 4 |
| megacarpum, Torr. | 5 |
| sparsiflorum, Turcz. | 4 |
| Thamnosma, Torr. & Frem. | 418 |
| montanum, Torr. & Frem. | 418 |
| Thaspium trifoliatum, Gray | 125 |
| Theloschistes parietinus | 412 |
| Thelypodium, Endl. | 25 |
| brachcarpum, Torr. | 26 |
| flavescens, S. Watson | 25 |
| integrifolium, Endl. | 25 |
| laciniatum, Endl. | 26 |
| linearifolium, Gray | 25 |
| longifolium, S. Watson | 25 |
| Nuttallii, S. Watson | 26 |
| pinnatifidum, S. Watson | 25 |
| sagittatum, Endl. | 25 |
| Thermopsis fabacea, DC. | 53 |
| *montana*, Nutt. | 53 |
| Thlaspi alpestre, L. | 31 |
| cochleariforme, DC. | 31 |
| *Fendleri*, Gray | 31 |
| Thysanocarpus, Hook. | 31 |
| crenatus, Nutt. | 31 |
| *curvipes*, Hook. | 31 |
| elegans, F. & M. | 31 |
| laciniatus, Nutt. | 31 |
| *oblongifolius*, Nutt. | 31 |
| *pulchellus*, F. & M. | 31 |

Page.
Thysanocarpus pusillus, Hook. ... 31
radians, Benth. ... 31
Tillæa angustifolia, Nutt. ... 101
Timmia megapolitana, Hedw. ... 408
*Tiquilia*, Pers. ... 247
*brevifolia*, Nutt. ... 247, 248
Tithonia, Desf. ... 423
argophylla, D. C. Eaton ... 423
Townsendia, Hook. ... 145
scapigera, D. C. Eaton ... 145
strigosa, Nutt. ... 145
Tradescantia Virginica, L. ... 359
Tricardia, Torr. ... 258
Watsoni, Torr. ... 258
Trifolium Andersonii, Gray ... 60
Andinum, Nutt. ... 60
cyathiferum, Lindl. ... 62
dasyphyllum, T. & G. ... 60
fimbriatum, Lindl. ... 61
gymnocarpon, Nutt. ... 62
Kingii, S. Watson ... 59
longipes, Nutt. ... 59
microcephalum, Pursh ... 61
nanum, Torr. ... 59
*obtusiflorum*, Hook. ... 61
Parryi, Gray ... 61
subcaulescens, Gray ... 59
variegatum, Nutt. ... 61
Triglochin maritimum, L. ... 340
palustre, L. ... 340
Trisetum subspicatum, Beauv. ... 392
*Triteleia grandiflora*, Lindl. ... 354
Triticum *ægilopoides*, Turcz. ... 390
caninum, L. ... 390
repens, L. ... 390
strigosum, Steud. ... 390
Trollius laxus, Salisb. ... 10
Troximon cuspidatum, Pursh ... 204
*glaucum*, Nutt. ... 204
parviflorum, Nutt. ... 205
*roseum*, Nutt. ... 205
*Turritis glabra*, L. ... 17
*macrocarpa*, Nutt. ... 17
*patula*, Grah. ... 18
*retrofracta*, Hook. ... 18
Typha latifolia, L. ... 337
TYPHACEÆ ... 337
Ulva merismopedioides, Woods ... 415
UMBELLIFERÆ ... 126
*Uniola stricta*, Torr. ... 385
Urtica dioica, L. ... 321
*gracilis*, Ait. ... 321
URTICACEÆ ... 321
Utricularia minor, L. ... 215
vulgaris, L. ... 214
*Vaccaria vulgaris*, Host. ... 36
Vaccinium cæspitosum, Mx. ... 209, 425
myrtilloides, Mx. ... 209
Myrtillus, L. ... 209
uliginosum, L. ... 209
Page.
Valeriana dioica, L. ... 136
edulis, Nutt. ... 136
*sylvatica*, Rich. ... 136
VALERIANACEÆ ... 136
Vaseya, Thurb. ... 378
comata, Thurb. ... 378
Veratrum album, L. ... 344
*Californicum*, Dur. ... 344
*Eschscholtzii*, Gray ... 344
*Lobelianum*, Banks ... 344
viride, Ait. ... 344
Verbascum Thapsus, L. ... 215
Verbena bracteosa, Mx. ... 234
hastata, L. ... 234
VERBENACEÆ ... 234
Veronica alpina, L. ... 227
Americana, Schwein. ... 227
Anagallis, L. ... 227
peregrina, L. ... 228
serpyllifolia, L. ... 228
Vesicaria *didymocarpa*, Hook. ... 20
montana, Gray ... 20
Vicia Americana, Muhl. ... 78
Vilfa airoides, Trin. ... 375
asperifolia, Nees & Mey. ... 375
cryptandra, Torr. ... 375
cuspidata, Torr. ... 376
depauperata, Torr. ... 376
ramulosa, HBK. ... 376
Villarsia pumila, Griseb. ... 281
Viola Beckwithii, T. & G. ... 35
Canadensis, L. ... 35
canina, L. ... 34
cucullata, Ait. ... 34
delphinifolia, Nutt. ... 35
Nuttallii, Pursh ... 35, 416
palustris, L. ... 34
pedunculata, T. & G. ... 35
*præmorsa*, Dougl. ... 35
VIOLACEÆ ... 34
Viscaria, DC., Roth. ... 430
Webera albicans, Wahl. ... 405
cruda, Schreb. ... 405
nutans, Schreb. ... 405
Weisia crispula, Hedw. ... 398
Weldenia, Schult. f. ... 349
Woodsia Oregana, D. C. Eaton ... 397
scopulina, D. C. Eaton ... 397
Wyethia, Nutt. ... 166
amplexicaulis, Nutt. ... 166
mollis, Gray ... 167
Xanthium strumarium, L. ... 166
Yucca, L. ... 355, 496
angustifolia, Pursh ... 496
brevifolia, Eng. ... 496
baccata, Torr. ... 496
*Draconis*, Torr. ... 496
*parviflora*, Torr. ... 497
*stricta*, Sims ... 496
Whipplei, Torr. ... 496

| | Page. |
|---|---|
| Zannichellia palustris, L. | 337 |
| Zauschneria, Presl | 104 |
| Californica, Presl | 104 |
| Zigadenus *Douglasii*, Torr. | 343 |
| Fremontii, Torr. | 343 |
| Zigadenus glaucus, Nutt. | 343 |
| Nuttallii, Gray | 343 |
| paniculatus, S. Watson | 343 |
| ZYGOPHYLLACEÆ | 417 |